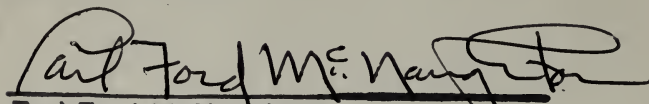


Collection of Native North American Indian Books,
Historical Books, Atlases, plus other important au-
thors and family heirloom books.

As of 12-31-93



Earl Ford McNaughton

SOURCE BOOK IN ANTHROPOLOGY

BY

A. L. KROEBER AND T. T. WATERMAN

UNIVERSITY OF CALIFORNIA PRESS
BERKELEY

1920

UNIVERSITY OF CALIFORNIA SYLLABUS SERIES No. 118

PREFACE

The passages in this volume have been selected for their utility in stimulating discussion. They are included not because they present ultimate scientific truth, but because they embody facts and interpretations which are useful for the exercise of thought on some of the larger problems of anthropology.

The volume was undertaken and was published in several smaller editions as an auxiliary to an ordinary working library in anthropology. In that stage it embodied chiefly articles which are out of print or accessible in journals of which a library, even a great library, often possesses only a single file. In its present form the volume is intended as the basis for study in courses of instruction in general anthropology. Any library will provide collateral and special reading.

There are some famous and many useful passages in anthropological literature which might well have been included. In some of these cases copyright privileges conflicted. In other instances, articles have been omitted because they were essentially interpretative or controversial, assuming the facts as known, instead of presenting them. Nothing has been included here which is available in W. I. Thomas' *Source Book for Social Origins*.

A. L. KROEBER.

T. T. WATERMAN.

CONTENTS

(The titles given below are those assigned to the extracts herein reproduced. Full reference to the original will be found at the beginning of each extract.)

	PAGE
1. Herodotus. Some Greek Explanations of Geographical and Anthropological Facts.....	5
2. Lucretius. Roman Speculations on the Origin of Man and Civilization.....	17
3. E. Ray Lankester. Table of Stratified Rocks.....	24
4. F. A. Lucas. How the History of the Past is Read.....	25
5. Charles Darwin. The Struggle for Existence and Natural Selection..	32
6. Thomas H. Huxley. On the Relations of Man to the Lower Animals	47
7. Charles Darwin. The Mental Powers of Man and the Lower Animals.....	71
8. Thomas H. Huxley. The Man-like Apes.....	78
9. A. Hrdlička. The Most Ancient Skeletal Remains of Man.....	87
10. E. B. Tylor. The Stone Age—Past and Present.....	111
11. Lord Avebury. The Divisions of Prehistoric Time.....	119
12. Irving Fisher. Some Principles of Mendelian Heredity.....	122
13. Francis Galton. Hereditary Genius.....	130
14. Karl Pearson. Mental and Moral Inheritance.....	147
15. Gustav Retzius. The Development of Race Measurements and Classifications.....	158
16. J. Deniker. Measurements of Men.....	166
17. Humphrey J. Johnson. Race, Language and Nationality in Europe	177
18. Felix von Luschan. The Early Inhabitants of Western Asia	185
19. Franz Boas. The Type of the Half-Breed Indian.....	203
20. Earl Finch. The Effects of Racial Miscegenation.....	209
21. R. S. Woodworth. Racial Differences in Mental Traits.....	213
22. David Prescott Barrows. Habitat and Food Plants of the Coahuilla Indians.....	223
23. A. E. Jenks. Terrace Agriculture in the Philippines.....	239
24. H. J. Spinden. The Origin and Distribution of Agriculture in America.....	245
25. Clark Wissler. The Influence of the Horse in the Development of Plains Culture.....	252
26. W. H. Holmes. Architecture of the Ancient Maya.....	260
27. W. Jochelson. The Semi-subterranean House of the Koryak of Northeastern Siberia.....	278
28. Otis T. Mason. American Indian Basket Weaves.....	286
29. Nels C. Nelson. Flint Working by Ishi.....	305
30. Clark Wissler. Costumes of the Plains Indians.....	312

31. E. B. Tylor. On a Method of Investigating the Development of Institutions; Applied to Laws of Marriage and Descent.....	321
32. Franz Boas. Eskimo Society.....	343
33. Robert H. Lowie. Marriage and Society among the Crow Indians..	349
34. Lewis H. Morgan. The Iroquois Gens.....	355
35. J. Owen Dorsey. The Gentile System of the Omaha.....	363
36. Edward Winslow Gifford. Miwok Moieties.....	373
37. Baldwin Spencer and F. J. Gillen. Australian Marriage Classes and Totems.....	380
38. Franz Boas. The Potlatch of the Kwakiutl Indians of Vancouver Island.....	389
39. Benjamin Danks. Shell-Money of New Britain.....	395
40. R. F. Barton. Ifugao Law.....	403
41. George Bird Grinnell. Warfare of the Plains Indians.....	421
42. Franz Boas. The Decorative Art of the Indians of the North Pacific Coast.....	428
43. E. A. Wallis Budge. Egyptian Hieroglyphic Writing.....	447
44. The Book of the Life of the Ancient Mexicans.....	462
45. Washington Matthews. Religious Songs and Prayers of the Navaho	481
46. R. H. Codrington. Melanesian Religion.....	484
47. W. Thalbitzer. The Heathen Priests of East Greenland.....	491
48. Canon Callaway. The Religion of the Amazulu of South Africa as Told by Themselves.....	498
49. Alice C. Fletcher. The Dakota Elk Ceremony.....	507
50. P. E. Goddard. Magic Formulas of the Hupa Indians.....	514
51. Sir George Grey. The Creation According to the Maori of New Zealand	516
52. R. B. Dixon. The Creation According to the Maidu Indians of California	530
53. John R. Swanton. The Creation According to the Tlingit Indians of Southern Alaska.....	535
54. The Bible. The Creation According to the Ancient Hebrews.....	542
Bibliography.....	550

1. SOME GREEK EXPLANATIONS OF GEOGRAPHICAL AND ANTHROPOLOGICAL FACTS

By HERODOTUS¹

THE NILE, THE LAND OF EGYPT, AND THE EGYPTIANS²

Now the Nile, when it overflows, floods not only the Delta, but also the tracts of country on both sides the stream which are thought to belong to Libya and Arabia, in some places reaching to the extent of two days' journey from its banks, in some even exceeding that distance, but in others falling short of it.

Concerning the nature of the river, I was not able to gain any information either from the priests or from others. I was particularly anxious to learn from them why the Nile, at the commencement of the summer solstice, begins to rise, and continues to increase for a hundred days—and why, as soon as that number is past, it forthwith retires and contracts its stream, continuing low during the whole of the winter until the summer solstice comes round again. On none of these points could I obtain any explanation from the inhabitants, though I made every inquiry, wishing to know what was commonly reported—they could neither tell me what special virtue the Nile has which makes it so opposite in its nature to all other streams, nor why, unlike every other river, it gives forth no breezes from its surface.

Some of the Greeks, however, wishing to get a reputation for cleverness, have offered explanations of the phenomena of the river, for which they have accounted in three different ways. Two of these I do not think it worth while to speak of, further than simply to mention what they are. One pretends that the Etesian winds cause the rise of the river by preventing the Nile-water from running off into the sea. But in the first place it has often happened, when the Etesian winds did not blow, that the Nile has risen according to its usual wont; and further, if the Etesian winds produced the effect, the other rivers which flow in a direction opposite to those winds ought to present the same phenomena as the Nile, and the more so as they are all smaller streams, and have a weaker current. But these rivers, of which there are many both in Syria and Libya, are entirely unlike the Nile in this respect.

The second opinion is even more unscientific than the one just mentioned, and also, if I may so say, more marvelous. It is that the Nile acts so strangely, because it flows from the ocean, and that the ocean flows all around the earth.

¹Herodotus, the "father of history," but equally that of anthropology, wrote in the fifth century B.C. The extracts here given are from the translation by George Rawlinson.

²Book II, Sec. 19-37.

The third explanation, which is very much more plausible than either of the others, is positively the furthest from the truth; for there is really nothing in what it says, any more than in the other theories. It is that the inundation of the Nile is caused by the melting of snows. Now, as the Nile flows out of Libya, through Ethiopia, into Egypt, how is it possible that it can be formed of melted snow, running, as it does, from the hottest regions of the world into cooler countries? Many are the proofs whereby any one capable of reasoning on the subject may be convinced that it is most unlikely this should be the case. The first and strongest argument is furnished by the winds, which always blow hot from these regions. The second is, that rain and frost are unknown there. Now whenever snow falls, it must of necessity rain within five days; so that, if there were snow, there must be rain also in those parts. Thirdly, it is certain that the natives of the country are black with the heat, that the kites and the swallows remain there the whole year, and that the cranes, when they fly from the rigours of a Scythian winter, flock thither to pass the cold season. If then, in the country whence the Nile has its source, or in that through which it flows, there fell ever so little snow, it is absolutely impossible that any of these circumstances could take place.

As for the writer who attributes the phenomenon to the ocean, his account is involved in such obscurity, that it is impossible to disprove it by argument. For my part I know of no river called Ocean, and I think that Homer, or one of the earlier poets, invented the name, and introduced it into his poetry.

Perhaps, after censuring all the opinions that have been put forward on this obscure subject, one ought to propose some theory of one's own. I will therefore proceed to explain what I think to be the reason of the Nile's swelling in the summer time. During the winter, the sun is driven out of his usual course by the storms, and removes to the upper parts of Libya. This is the whole secret in the fewest possible words; for it stands to reason that the country to which the Sun-god approaches the nearest, and which he passes most directly over, will be scantest of water, and that there the streams which feed the rivers will shrink the most.

To explain, however, more at length, the case is this. The sun, in his passage across the upper parts of Libya, affects them in the following way: As the air in those regions is constantly clear, and the country warm through the absence of cold winds, the sun in his passage across them acts upon them exactly as he is wont to act elsewhere in summer, when his path is in the middle of heaven—that is, he attracts the water. After attracting it, he again repels it into the upper regions, where the winds lay hold of it, scatter it, and reduce it to a vapor, whence it naturally enough comes to pass that the winds which blow from this quarter—the south and southwest—are of all winds the most rainy. And my own opinion is that the sun does not get rid of all the water which he draws year by year from the Nile, but retains some about him. When the winter begins to soften, the sun goes back again to his old place in the middle of the heaven, and proceeds to attract water equally from all countries.

Till then the other rivers run big, from the quantity of rain-water which they bring down from countries where so much moisture falls that all the land is cut into gullies; but in the summer, when the showers fail, and the sun attracts their water, they become low. The Nile, on the contrary, not deriving any of its bulk from rains, and being in winter subject to the attraction of the sun, naturally runs at that season, unlike all other streams, with a less burthen of water than in the summer time. For in summer it is exposed to attraction equally with all other rivers, but in winter it suffers alone. The sun, therefore, I regard as the sole cause of the phenomenon.

It is the sun, also, in my opinion, which, by heating the space through which it passes, makes the air in Egypt so dry. There is thus perpetual summer in the upper parts of Libya. Were the position of the heavenly regions reversed, so that the place where now the north wind and the winter have their dwelling became the station of the south wind and of the noon-day, while, on the other hand, the station of the south wind became that of the north, the consequence would be that the sun, driven from the mid-heaven by the winter and the northern gales, would betake himself to the upper parts of Europe, as he now does to those of Libya, and then I believe his passage across Europe would affect the Ister exactly as the Nile is affected at the present day.

And with respect to the fact that no breeze blows from the Nile, I am of opinion that no wind is likely to arise in very hot countries, for breezes love to blow from some cold quarter.

Let us leave these things, however, to their natural course, to continue as they are and have been from the beginning. With regard to the *sources* of the Nile, I have found no one among all those with whom I have conversed, whether Egyptians, Libyans, or Greeks, who professed to have any knowledge, except a single person. He was the scribe who kept the register of the sacred treasures of Minerva in the city of Saïs, and he did not seem to me to be in earnest when he said that he knew them perfectly well. His story was as follows: "Between Syené, a city of the Thebaïs, and Elephantiné, there are" (he said) "two hills with sharp conical tops; the name of the one is Crophî, of the other, Mophî. Midway between them are the fountains of the Nile, fountains which it is impossible to fathom. Half the water runs northward into Egypt, half to the south towards Ethiopia." The fountains were known to be unfathomable, he declared, because Psammetichus, an Egyptian king, had made trial of them. He had caused a rope to be made, many thousand fathoms in length, and had sounded the fountain with it, but could find no bottom. By this the scribe gave me to understand, if there was any truth at all in what he said, that in this fountain there are certain strong eddies, and a regurgitation, owing to the force wherewith the water dashes against the mountains, and hence a sounding-line cannot be got to reach the bottom of the spring.

No other information on this head could I obtain from any quarter. All that I succeeded in learning further of the more distant portions of the Nile, by ascending myself as high as Elephantiné, and making inquiries concerning the parts beyond, was the following: As one advances beyond Elephantiné, the land rises. Hence it is necessary in this part of the river to attach a rope to the boat on each side, as men harness an ox, and so proceed on the journey. If the rope snaps, the vessel is borne away down stream by the force of the current. The navigation continues the same for four days, the river winding greatly, like the Meander, and the distance traversed amounting to twelve schoenes. Here you come upon a smooth and level plain, where the Nile flows in two branches, round an island called Tachompsó. The country above Elephantiné is inhabited by the Ethiopians, who possess one-half of this island, the Egyptians occupying the other. Above the island there is a great lake, the shores of which are inhabited by Ethiopian nomads; after passing it, you come again to the stream of the Nile, which runs into the lake. Here you land, and travel for forty days along the banks of the river, since it is impossible to proceed further in a boat on account of the sharp peaks which jut out from the water, and the sunken rocks which abound in that part of the stream. When you have passed this portion of the river in the space of forty days, you go on board another boat and proceed by water for twelve days more, at the end of which time you reach a great city called Meroë, which is said to be the capital of the other Ethiopians. The only gods worshipped by the inhabitants are Jupiter and Bacchus, to whom great honours are paid. There is an oracle of Jupiter in the city, which directs the warlike expeditions of the Ethiopians; when it commands they go to war, and in whatever direction it bids them march, thither straightway they carry their arms.

On leaving this city, and again mounting the stream, in the same space of time which it took you to reach the capital of Elephantiné, you come to the Deserters, who bear the name of Asmach. This word, translated into our language, means "the men who stand on the left hand of the king." These Deserters are Egyptians of the warrior caste, who, to the number of two hundred and forty thousand, went over to the Ethiopians in the reign of king Psammetichus. The cause of their desertion was the following: Three garrisons were maintained in Egypt at that time, one in the city of Elephantiné against the Ethiopians, another in the Pelusiæ Daphnæ, against the Syrians and Arabians, and a third, against the Libyans, in Marea. (The very same posts are to this day occupied by the Persians, whose forces are in garrison both in Daphnæ and in Elephantiné.) Now it happened, that on one occasion the garrisons were not relieved during the space of three years; the soldiers, therefore, at the end of that time, consulted together, and having determined by common consent to revolt, marched away toward Ethiopia. Psammetichus, informed of the movement, set out in pursuit, and coming up with them, besought them with many words not to desert the gods of their country, nor abandon their wives and children. "Nay, but," said one of the deserters

with an unseemly gesture, "wherever we go, we are sure enough of finding wives and children." Arrived in Ethiopia, they placed themselves at the disposal of the king. In return, he made them a present of a tract of land which belonged to certain Ethiopians with whom he was at feud, bidding them expel the inhabitants and take possession of their territory. From the time that this settlement was formed, their acquaintance with Egyptian manners has tended to civilise the Ethiopians.

Thus the course of the Nile is known, not only throughout Egypt, but to the extent of four months' journey either by land or water above the Egyptian boundary; for on calculation it will be found that it takes that length of time to travel from Elephantiné to the country of the Deserters. There the direction of the river is from west to east. Beyond, no one has any certain knowledge of its course, since the country is uninhabited by reason of the excessive heat.

I did hear, indeed, what I will now relate, from certain natives of Cyrené. Once upon a time, they said, they were on a visit to the oracular shrine of Ammon, when it chanced that in the course of conversation with Etearchus, the Ammonian king, the talk fell upon the Nile, how that its sources were unknown to all men. Etearchus upon this mentioned that some Nasamonians had once come to his court, and when asked if they could give any information concerning the uninhabited parts of Libya, had told the following tale: (The Nasamonians are a Libyan race who occupy the Syrtis, and a tract of no great size towards the east.) They said there had grown up among them some wild young men, the sons of certain chiefs, who, when they came to man's estate, indulged in all manner of extravagancies, and among other things drew lots for five of their number to go and explore the desert parts of Libya, and try if they could not penetrate further than any had done previously. The coast of Libya along the sea which washes it to the north, throughout its entire length from Egypt to Cape Soloeis, which is its furthest point, is inhabited by Libyans of many distinct tribes who possess the whole tract except certain portions which belong to the Phoenicians and the Greeks. Above the coastline and the country inhabited by the maritime tribes, Libya is full of wild beasts; while beyond the wild beast region there is a tract which is wholly sand, very scant of water, and utterly and entirely a desert. The young men therefore, despatched on this errand by their comrades with a plentiful supply of water and provisions, travelled at first through the inhabited region, passing which they came to the wild-beast tract, whence they finally entered upon the desert, which they proceeded to cross in a direction from east to west. After journeying for many days over a wide extent of sand, they came at last to a plain where they observed trees growing; approaching them, and seeing fruit on them, they proceeded to gather it. While they were thus engaged, there came upon them some dwarfish men, under the middle height, who seized them and carried them off. The Nasamonians could not understand a word of their language, nor had they any acquaintance with the language of the Nasamonians.

They were led across extensive marshes, and finally came to a town, where all the men were of the height of their conductors, and black complexioned. A great river flowed by the town, running from west to east, and containing crocodiles.

Here let me dismiss Etearchus the Ammonian, and his story, only adding that (according to the Cyrenæans) he declared that the Nasamonians got safe back to their country, and that the men whose city they had reached were a nation of sorcerers. With respect to the river which ran by their town, Etearchus conjectured it to be the Nile; and reason favours that view. For the Nile certainly flows out of Libya, dividing it down the middle, and as I conceive judging the unknown from the known, rises at the same distance from its mouth as the Ister. This latter river has its source in the country of the Celts near the city of Pyrené, and runs through the middle of Europe, dividing it into two portions. The Celts live beyond the pillars of Hercules, and border on the Cynesians, who dwell at the extreme west of Europe. Thus the Ister flows through the whole of Europe before it finally empties itself into the Euxine at Istria, one of the colonies of the Milesians.

Now as this river flows through regions that are inhabited, its course is perfectly well known; but of the sources of the Nile no one can give any account, since Libya, the country through which it passes, is desert and without inhabitants. As far as it was possible to get information by inquiry, I have given a description of the stream. It enters Egypt from the parts beyond. Egypt lies almost exactly opposite the mountainous portions of Cilicia, whence a lightly-equipped traveller may reach Sinopé on the Euxine in five days by the direct route. Sinopé lies opposite the place where the Ister falls into the sea. My opinion therefore is that the Nile, as it traverses the whole of Libya, is of equal length with the Ister. And here I take my leave of this subject.

Concerning Egypt itself I shall extend my remarks to a great length, because there is no country that possesses so many wonders, nor that has such a number of works which defy description. Not only is the climate different from that of the rest of the world, and the rivers unlike any other rivers, but the people also, in most of their manners and customs, exactly reverse the common practice of mankind. The women attend the markets and trade, while the men sit at home at the loom; and here, while the rest of the world works the woof up the warp, the Egyptians work it down; the women likewise carry burthens upon their shoulders, while the men carry them upon their heads. They eat their food out of doors in the streets, but retire for private purposes to their houses, giving as a reason that what is unseemly, but necessary, ought to be done in secret, but what has nothing unseemly about it, should be done openly. A women cannot serve the priestly office, either for god or goddess, but men are priests to both; sons need not support their parents unless they choose; but daughters must, whether they choose or no.

In other countries the priests have long hair, in Egypt their heads are shaven; elsewhere it is customary, in mourning, for near relations to cut their

hair close; the Egyptians, who wear no hair at any other time, when they lose a relative, let their beards and the hair of their heads grow long. All other men pass their lives separate from animals, the Egyptians have animals always living with them; others make barley and wheat their food; it is a disgrace to do so in Egypt, where the grain they live on is spelt, which some call *zea*. Dough they knead with their feet; but they mix mud, and even take up dirt, with their hands. They are the only people in the world—they at least, and such as have learnt the practice from them—who use circumcision. Their men wear two garments apiece, their women but one. They put on the rings and fasten the ropes to sails inside; others put them outside. When they write or calculate, instead of going, like the Greeks, from left to right, they move their hand from right to left; and they insist, notwithstanding, that it is they who go to the right, and the Greeks who go to the left. They have two quite different kinds of writing, one of which is called sacred, the other common.

They are religious to excess, far beyond any other race of men, and use the following ceremonies: They drink out of brazen cups, which they scour every day; there is no exception to this practice. They wear linen garments, which they are specially careful to have always fresh washed. They practice circumcision for the sake of cleanliness, considering it better to be cleanly than comely. The priests shave their whole body every other day, that no lice or other impure thing may adhere to them when they are engaged in the service of the gods. Their dress is entirely of linen, and their shoes of the papyrus plant; it is not lawful for them to wear either dress or shoes of any other material. They bathe twice every day in cold water, and twice each night; besides which they observe, so to speak, thousands of ceremonies. They enjoy, however, not a few advantages. They consume none of their own property, and are at no expense for anything; but every day bread is baked for them of the sacred corn, and a plentiful supply of beef and of goose's flesh is assigned to each, and also a portion of wine made from the grape. Fish they are not allowed to eat; and beans—which none of the Egyptians ever sow, or eat, if they come up of their own accord, either raw or boiled—the priests will not even endure to look on, since they consider it an unclean kind of pulse. Instead of a single priest, each god has the attendance of a college, at the head of which is a chief priest; when one of these dies, his son is appointed in his room.

THE ANTIQUITY OF EGYPT AND THE ORIGINAL LANGUAGE OF MANKIND³

Now the Egyptians, before the reign of their king Psammetichus, believed themselves to be the most ancient of mankind. Since Psammetichus, however, made an attempt to discover who were actually the primitive race, they have been of opinion that while they surpass all other nations, the Phrygians surpass

³Book II, Sec. 2-4.

them in antiquity. This king, finding it impossible to make out by dint of inquiry what men were the most ancient, contrived the following method of discovery: He took two children of the common sort, and gave them over to a herdsman to bring up at his folds, strictly charging him to let no one utter a word in their presence, but to keep them in a sequestered cottage, and from time to time introduce goats to their apartment, see that they got their fill of milk, and in all other respects look after them. His object herein was to know, after the indistinct babblings of infancy were over, what word they would first articulate. It happened as he had anticipated. The herdsman obeyed his orders for two years, and at the end of that time, on his one day opening the door of their room and going in, the children both ran up to him with outstretched arms, and distinctly said "Becos." When this first happened the herdsman took no notice; but afterwards when he observed, on coming often to see after them, that the word was constantly in their mouths, he informed his lord, and by his command brought the children into his presence. Psammetichus then himself heard them say the word, upon which he proceeded to make inquiry what people there was who called anything "becos," and hereupon he learnt that "becos" was the Phrygian name for bread. In consideration of this circumstance the Egyptians yielded their claims, and admitted the greater antiquity of the Phrygians.

That these were the real facts I learnt at Memphis from the priests of Vulcan. The Greeks, among other foolish tales, relate that Psammetichus had the children brought up by women whose tongues he had previously cut out; but the priests said their bringing up was such as I have stated above. I got much other information also from the conversation with these priests while I was at Memphis, and I even went to Heliopolis and to Thebes, expressly to try whether the priests of those places would agree in their accounts with the priests at Memphis. The Heliopolitans have the reputation of being the best skilled in history of all Egyptians. What they told me concerning their religion it is not my intention to repeat, except the names of their deities, which I believe all men know equally. If I relate anything else concerning these matters, it will only be when compelled to do so by the course of my narrative.

Now with regard to mere human matters, the accounts which they gave, and in which all agreed, were the following: The Egyptians, they said were the first to discover the solar year, and to portion out its course into twelve parts. They obtained this knowledge from the stars. (To my mind they contrive their year much more cleverly than the Greeks, for these last every other year intercalate a whole month, but the Egyptians, dividing the year into twelve months of thirty days each, add every year a space of five days besides, whereby the circuit of the seasons is made to return with uniformity.) The Egyptians, they went on to affirm, first brought into use the names of the twelve gods, which the Greeks adopted from them; and first erected altars, images, and temples to the gods; and also first engraved upon stone the figures

of animals. In most of these cases they proved to me that what they said was true. And they told me that the first man who ruled over Egypt was Mên, and that in his time all Egypt, except the Thebaic canton, was a marsh, none of the land below Lake Moeris then showing itself above the surface of the water. This is a distance of seven days' sail from the sea up the river.

THE ORIGIN OF A RELIGIOUS ORACLE⁴

The following tale is commonly told in Egypt concerning the oracle of Dodôna in Greece, and that of Ammon in Libya. My informants on the point were the priests of Jupiter at Thebes. They said "that two of the sacred women were once carried off from Thebes by the Phoenicians, and that the story went that one of them was sold into Libya, and the other into Greece, and these women were the first founders of the oracles in the two countries." On my inquiring how they came to know so exactly what became of the women, they answered, "that diligent search had been made after them at the time, but that it had not been found possible to discover where they were; afterwards, however, they received the information which they had given me."

This was what I heard from the priests at Thebes; at Dodôna, however, the women who deliver the oracles relate the matter as follows: "Two black doves flew away from Egyptian Thebes, and while one directed its flight to Libya, the other came to them. She alighted on an oak, and sitting there began to speak with a human voice, and told them that on the spot where she was, there should henceforth be an oracle of Jove. They understood the announcement to be from heaven, so they set to work at once and erected the shrine. The dove which flew to Libya bade the Libyans to establish there the oracle of Ammon." This likewise is an oracle of Jupiter. The persons from whom I received these particulars were three priestesses of the Dodonæans, the oldest Promeneia, the next Timareté, and the youngest Nicandra—what they said was confirmed by the other Dodonæans who dwell around the temple.

My own opinion of these matters is as follows: I think that, if it be true that the Phoenicians carried off the holy women, and sold them for slaves, the one into Libya and the other into Greece, or Pelasgia (as it was then called), this last must have been sold to the Thesprotians. Afterwards, while undergoing servitude in those parts, she built under a real oak a temple to Jupiter at Thebes—to that particular god. Then, having acquired a knowledge of the Greek tongue, she set up an oracle. She also mentioned that her sister had been sold for a slave into Libya by the same persons as herself.

The Dodonæans called the women doves because they were foreigners, and seemed to them to make a noise like birds. After a while the dove spoke with a human voice, because the woman, whose foreign talk had previously sounded to them like the chattering of a bird, acquired the power of speaking what they could understand. For how can it be conceived possible that a

⁴Book II, Sec. 54-58.

dove should really speak with the voice of a man? Lastly, by calling the dove black the Dodonæans indicated that the woman was an Egyptian. And certainly the character of the oracles at Thebes and Dodôna is very similar. Besides this form of divination, the Greeks learnt also divination by means of victims from the Egyptians.

The Egyptians were also the first to introduce solemn assemblies, processions, and litanies to the gods; of all which the Greeks were taught the use by them. It seems to me a sufficient proof of this, that in Egypt these practices have been established from remote antiquity, while in Greece they are only recently known.

A RACIAL PECULIARITY AND ITS CAUSE⁵

On the field where this battle was fought I saw a very wonderful thing which the natives pointed out to me. The bones of the slain lie scattered upon the field in two lots, those of the Persians in one place by themselves, as the bodies lay at the first—those of the Egyptians in another place apart from them. If, then, you strike the Persian skulls, even with a pebble, they are so weak that you break a hole in them; but the Egyptian skulls are so strong, that you may smite them with a stone and you will scarcely break them in. They gave me the following reason for this difference, which seemed to me likely enough: The Egyptians (they said) from early childhood have the head shaved, and so by the action of the sun the skull becomes thick and hard. The same cause prevents baldness in Egypt, where you see fewer bald men than in any other lands. Such, then, is the reason why the skulls of the Egyptians are so strong. The Persians, on the other hand, have feeble skulls, because they keep themselves shaded from the first, wearing turbans upon their heads. What I have here mentioned I saw with my own eyes, and I observed also the like at Paprêmis, in the case of the Persians who were killed with Achæmenes, the son of Darius, by Inarus the Libyan.

HABITS OF SOME AFRICAN TRIBES⁶

Ten days' journey from Augilia there is again a salt-hill and a spring; palms of the fruitful kind grow here abundantly, as they do also at the other salt-hills. This region is inhabited by a nation called the Garamantians, a very powerful people, who cover the salt with mould, and then sow their crops. From thence is the shortest road to the Lotophagi, a journey of thirty days. In the Garamantian country are found the oxen which, as they graze, walk backwards. This they do because their horns curve outwards in front of their heads, so that it is not possible for them when grazing to move for-

⁵Book III, Sec. 12.

⁶Book IV, Sec. 183-185.

wards, since in that case their horns would become fixed in the ground. Only herein do they differ from other oxen, and further in the thickness and hardness of their hides. The Garamantians have four-horse chariots, in which they chase the Troglodyte Ethiopians, who of all the nations whereof any account has reached our ears are by far the swiftest of foot. The Troglodytes feed on serpents, lizards, and other similar reptiles. Their language is unlike that of any other people; it sounds like the screeching of bats.

At the distance of ten days' journey from the Garamantians there is again another salt-hill and spring of water; around which dwell a people, called the Atarantians, who alone of all known nations are destitute of names. The title of Atarantians is borne by the whole race in common; but the men have no particular names of their own. The Atarantians, when the sun rises high in the heaven, curse him, and load him with reproaches, because (they say) he burns and wastes both their country and themselves. Once more at the distance of ten days' journey there is a salt-hill, a spring, and an inhabited tract. Near the salt is a mountain called Atlas, very taper and round; so lofty, moreover, that the top (it is said) cannot be seen, the clouds never quitting it either summer or winter. The natives call this mountain "the Pillar of Heaven;" and they themselves take their name from it, being called Atlantes. They are reported not to eat any living thing, and never to have any dreams.

As far as the Atlantes the names of the nations inhabiting the sandy ridge are known to me; but beyond them any knowledge fails. The ridge itself extends as far as the Pillars of Hercules, and even further than these; and throughout the whole distance, at the end of every ten days' journey, there is a salt-mine, with people dwelling round it who all of them build their houses with blocks of the salt. No rain falls in these parts of Libya; if it were otherwise, the walls of these houses could not stand. The salt quarried is of two colours, white and purple. Beyond the ridge, southwards, in the direction of the interior, the country is a desert, with no springs, no beasts, no rain, no wood, and altogether destitute of moisture.

BABYLONIAN CUSTOMS⁷

But that which surprises me most in the land, after the city itself, I will now proceed to mention. The boats which come down the river to Babylon are circular, and made of skins. The frames, which are of willow, are cut in the country of the Armenians above Assyria, and on these, which serve for hulls, a covering of skins is stretched outside, and thus the boats are made, without either stem or stern, quite round like a shield. They are then entirely filled with straw, and their cargo is put on board, after which they are suffered to float down the stream. Their chief freight is wine, stored in casks made of the wood of the palm tree. They are managed by two men who stand

⁷Book I, Sec. 194-196.

upright in them, each plying an oar, one pulling and the other pushing. The boats are of various sizes, some larger, some smaller; the biggest reach as high as five thousand talents' burthen. Each vessel has a live ass on board; those of larger size have more than one. When they reach Babylon, the cargo is landed and offered for sale; after which the men break up their boats, sell the straw and the frames, and loading their asses with the skins, set off on their way back to Armenia. The current is too strong to allow a boat to return upstream, for which reason they make their boats of skins rather than wood. On their return to Armenia they build fresh boats for the next voyage.

The dress of the Babylonians is a linen tunic reaching to the feet, and above it another tunic made in wool, besides which they have a short white cloak thrown round them, and shoes of a peculiar fashion, not unlike those worn by the Boeotians. They have long hair, wear turbans on their heads, and anoint their whole body with perfumes. Every one carries a seal, and a walking-stick, carved at the top into the form of an apple, a rose, a lily, an eagle, or something similar; for it is not their habit to use a stick without an ornament.

Of their customs, whereof I shall now proceed to give an account, the following (which I understand belongs to them in common with the Illyrian tribe of the Eneti) is the wisest in my judgment: Once a year in each village the maidens of age to marry were collected all together in one place, while the men stood round them in a circle. Then a herald called up the damsels one by one, and offered them for sale. He began with the most beautiful. When she was sold for no small sum of money, he offered for sale the one who came next to her in beauty. All of them were sold to be wives. The richest of the Babylonians who wished to wed bid against each other for the loveliest maidens, while the humbler wife-seekers, who were indifferent about beauty, took the more homely damsels with marriage-portions. For the custom was that when the herald had gone through the whole number of the beautiful damsels, he should then call up the ugliest—a cripple, if there chanced to be one—and offer her to the men, asking who would agree to take her with the smallest marriage-portion. And the man who offered to take the smallest sum had her assigned to him. The marriage-portions were furnished by the money paid for the beautiful damsels, and thus the fairer maidens portioned out the uglier. No one was allowed to give his daughter in marriage to the man of his choice, nor might any one carry away the damsel whom he had purchased without finding bail really and truly to make her his wife; if, however, it turned out that they did not agree, the money might be paid back. All who liked might come even from distant villages and bid for the women. This was the best of all their customs, but it has now fallen into disuse. They have lately hit upon a very different plan to save their maidens from violence, and prevent their being torn from them and carried to distant cities, which is to bring up their daughters to be courtesans. This is now done by all the poorer of the common people, who since the conquest have been maltreated by their lords, and have had ruin brought upon their families.

2. ROMAN SPECULATIONS ON THE ORIGIN OF MAN AND CIVILIZATION

By LUCRETIVS¹

THE ORIGIN OF MAN

In the beginning the earth gave forth all kinds of herbage and verdant sheen about the hills and over all the plains; the flowery meadows glittered with the bright green hue, and next in order to the different trees was given a strong and emulous desire of growing up into the air with full unbridled powers. As feathers and hairs and bristles are first born on the limbs of four-footed beasts and the body of the strong of wing, thus the new earth then first put forth grass and bushes, and next gave birth to the races of mortal creatures springing up many in number in many ways after divers fashions. For no living creatures can have dropped from heaven nor can those belonging to the land have come out of the salt pools. It follows that with good reason the earth has gotten the name of mother, since all things have been produced out of the earth. And many living creatures even now spring out of the earth taking form by rains and the heat of the sun. It is therefore the less strange if at that time they sprang up more in number and larger in size, having come to maturity in the freshness of earth and ether. First of all the race of fowls and the various birds would leave their eggs, hatched in the spring time, just as now in summer the cicades leave spontaneously their gossamer coats in quest of a living and life. Then you must know did the earth first give forth races of mortal men. For much heat and moisture would then abound in the fields; and therefore wherever a suitable spot offered, wombs would grow attached to the earth by roots; and when the warmth of the infants, flying the wet and craving the air, had opened these in the fulness of time, nature would turn to that spot the pores of the earth and constrain it to yield from its opened veins a liquid most like a milk, even as now-a-days every woman when she has borne, is filled with sweet milk, because all that current of nutriment streams toward the breasts. To the children the earth would furnish food, the heat raiment, the grass a bed rich in abundance of soft down. Then the fresh youth of the world would give forth neither severe colds nor excessive heats nor gales of great violence; for all things grow and acquire strength in a like proportion.

Wherefore again and again I say the earth with good title has gotten and keeps the name of mother, since she of herself gave birth to mankind and at a

¹Lucretius lived from 98 to 55 B.C. The passages here printed are selected from lines 783-1360 of the fifth book of the philosophical poem "*De Rerum Natura*," as translated by H. A. J. Munro.

time nearly fixed shed forth every beast that ranges wildly over the great mountains, and at the same time the fowls of the air with all their varied shapes. But because she must have some limit set to her bearing, she ceased like a woman worn out by length of days. For time changes the nature of the whole world and all things must pass on from one condition to another, and nothing continues like to itself: all things quit their bounds, all things nature changes and compels to alter. One thing crumbles away and is worn and enfeebled with age, then another comes into honour and issues out of its state of contempt. In this way then time changes the nature of the whole world and the earth passes out of one condition into another; what once it could, it can bear no more, in order to be able to bear what before it did not bear.

And many monsters too the earth at that time essayed to produce, things coming up with strange face and limbs, the man-woman, a thing between the two and neither the one sex nor the other, widely differing from both; some things deprived of feet, others again destitute of hands, others too proving dumb without mouth, or blind without eyes, and things bound fast by adhesion of their limbs over all the body, so that they could not do anything nor go anywhere nor avoid the evil nor take what their needs required. Every other monster and portent of this kind she would produce, but all in vain, since nature set a ban on their increase and they could not reach the coveted flower of age nor find food nor be united in marriage. For we see that many conditions must meet together in things in order that they may beget and continue their kinds; first a supply of food, then a way by which the birth-producing seeds throughout the frame may stream from the relaxed limbs; also in order that the woman may be united with the male, the possession of organs whereby they may each interchange mutual joys.

And many races of living things must then have died out and been unable to beget and continue their breed. For in the case of all things which you see breathing the breath of life, either craft or courage or else speed has from the beginning of its existence protected and preserved each particular race. And there are many things which, recommended to us by their useful services, continue to exist consigned to our protection. In the first place the fierce breed of lions and the savage races their courage has protected, foxes their craft and stags their proneness to flight. But light-sleeping dogs with faithful heart in breast and every kind which is born of the seed of beasts of burden and at the same time the woolly flocks and the horned herds are all consigned, Memmius, to the protection of man. For they have ever fled with eagerness from wild beasts and have ensued peace and plenty of food obtained without their own labour, as we give it in requital of their useful services. But those to whom nature has granted none of these qualities, so that they could neither live by their own means nor perform for us any useful service in return for which we should suffer their kind to feed and be safe under our protection, those, you are to know, would lie exposed as a prey and booty of others, hampered all in their own death-bringing shackles, until nature brought that kind to utter destruction.

THE FIRST BEGINNINGS OF CIVILIZATION

But the race of man then in the fields was much harder, as beseemed it to be, since the hard earth had produced it; and built on a groundwork of larger and more solid bones within, knit with powerful sinews throughout the frame of flesh; not lightly to be disabled by heat or cold or strange kinds of food or any malady of body. And during the revolution of many lustres of the sun through heaven they led a life after the roving fashion of wild beasts. No one then was a sturdy guider of the bent plough or knew how to labour the fields with iron or plant in the ground young saplings or lop with pruning-hooks old boughs from the high trees. What the sun and rains had given, what the earth had produced spontaneously, was guerdon sufficient to content their hearts. Among acorn-bearing oaks they would refresh their bodies for the most part; and the arbute berries which you now see in the winter time ripen with a bright scarlet hue, the earth would then bear in greatest plenty and of a larger size; and many coarse kinds of food besides the teeming freshness of the world then bare, more than enough for poor wretched men. But rivers and springs invited to slake thirst, even as now a rush of water down from the great hills summons with clear splash far and wide the thirsty races of wild beasts. Then too as they ranged about they would occupy the well-known woodland haunts of the nymphs, out of which they knew that smooth-gliding streams of water with a copious gush bathed the dripping rocks, trickling down over the green moss; and in parts welled and bubbled out over the level plain. And as yet they knew not how to apply fire to their purposes or to make use of skins and clothe their body in the spoils of wild beasts, but they would dwell in woods and mountain-caves and forests and shelter in the brush-wood their squalid limbs when driven to shun the buffeting of the winds and the rains. And they were unable to look to the general weal and knew not how to make a common use of any customs or laws. Whatever prize fortune threw in his way, each man would bear off, trained at his own discretion to think of himself and live for himself alone. And Venus would join the bodies of lovers in the woods; for each woman was gained over either by mutual desire or the headstrong violence and vehement lust of the man or a bribe of some acorns and arbute-berries or choice pears. And trusting to the marvellous powers of their hands and feet they would pursue the forest-haunting races of wild beasts with showers of stones and clubs of ponderous weight; and many they would conquer, a few they would avoid in hiding-places; and like to bristly swine just as they were they would throw their savage limbs all naked on the ground, when overtaken by night, covering themselves up with leaves and boughs.

FIRST SPEECH

Next after they had got themselves huts and skins and fire, and the woman united with the man passed with him into one (domicile and the duties of

wedlock were) learnt (by the two), and they saw an offspring born from them, then first mankind began to soften. For fire made their chilled bodies less able now to bear the frost beneath the canopy of heaven, and Venus impaired their strength and children with their caresses soon broke down the haughty temper of parents. Then too neighbours began to join in a league of friendship mutually desiring neither to do nor suffer harm; and asked for indulgence to children and womankind, when with cries and gestures they declared in stammering speech that meet it is for all to have mercy on the weak. And though harmony could not be established without exception, yet a very large portion observed their agreements with good faith, or else the race of man would then have been wholly cut off, nor could breeding have continued their generations to this day.

But nature impelled them to utter the various sounds of the tongue and use struck out the names of things, much in the same way as the inability to speak is seen in its turn to drive children to the use of gestures, when it forces them to point with the finger at the things which are before them. For every one feels how far he can make use of his peculiar powers. Ere the horns of a calf are formed and project from his forehead, he butts with it when angry and pushes out in his rage. Then whelps of panthers and cubs of lions fight with claws and feet and teeth at a time when teeth and claws are hardly yet formed. Again we see every kind of fowl trust to wings and seek from pinions a fluttering succor. Therefore to suppose that some one man at that time apportioned names to things and that men from him learnt their first words, is sheer folly. For why should this particular man be able to denote all things by words and to utter the various sounds of the tongue, and yet at the same time others be supposed not to have been able to do so? Again if others as well as he had not made use of words among themselves, whence was implanted in this man the previous conception of its use and whence was given to him the original faculty, to know and perceive in mind what he wanted to do? Again one man could not constrain and subdue and force many to choose to learn the names of things. It is no easy thing in any way to teach and convince the deaf of what is needful to be done; for they never would suffer nor in any way endure sounds of voice hitherto unheard to continue to be dinned ruthlessly into their ears. Lastly what is there so passing strange in this circumstance, that the race of men whose voice and tongue were in full force, should denote things by different words as different feelings prompted? Since dumb brutes, yes and the races of wild beasts are accustomed to give forth distinct and varied sounds, when they have fear or pain and when joys are rife.

THE USE OF FIRE

And lest haply on this head you ask in silent thought this question, it was lightning that brought fire down on earth for mortals in the beginning; thence the whole heat of flames is spread abroad. Thus we see many things shine

dyed in heavenly flames, when the stroke from heaven has stored them with its heat. Ay and without this when a branching tree sways to and fro and tosses about under the buffeting of the winds, pressing the boughs of another tree, fire is forced out by the power of the violent friction, and sometimes the burning heat of flame flashes out, the boughs and stems rubbing against each other. Now either of these accidents may have given fire to men. Next the sun taught them to cook food and soften it with the heat of flame, since they would see many things grow mellow, when subdued by the strokes of the rays and by heat throughout the land.

THE ORIGIN OF RELIGION

And now what cause has spread over great nations the worship of the divinities of the gods and filled towns with altars and led to the performance of stated sacred rites, rites now in fashion on solemn occasions and in solemn places, from which even now is implanted in mortals a shuddering awe which raises new temples of the gods over the whole earth and prompts men to crowd them on festive days, all this it is not so difficult to explain in words. Even then in sooth the races of mortal men would see in waking mind glorious forms, would see them in sleep of yet more marvellous size of body. To these then they would attribute sense, because they seemed to move their limbs and to utter lofty words suitable to their glorious aspect and surpassing powers. And they would give them life everlasting, because their face would ever appear before them and their form abide; yes and yet without all this, because they would not believe that beings possessed of such powers could lightly be overcome by any force. And they would believe them to be pre-eminent in bliss, because none of them was ever troubled with the fear of death, and because at the same time in sleep they would see them perform many miracles, yet feel on their part no fatigue from the effort. Again they would see the system of heaven and the different seasons of the years come round in regular succession, and could not find out by what causes this was done; and therefore they would seek a refuge in handing over all things to the gods and supposing all things to be guided by their nod. And they placed in heaven the abodes and realms of the gods, because night and moon are seen to roll through heaven, noon day and night and night's austere constellations and night-wandering meteors of the sky and flying bodies of flame, clouds, sun, rains, snow, winds, lightnings, hail, and rapid rumblings and loud threatening thunderclaps.

THE DISCOVERY OF METALS AND EVOLUTION OF MILITARY ART

To proceed, copper and gold and iron were discovered and at the same time weighty silver and the substance of lead, when fire with its heat had burnt up vast forests on the great hills, either by a discharge of heaven's lightning, or else because men waging with one another a forest-war had carried fire among

the enemy in order to strike terror, or because drawn on by the goodness of the soil they would wish to clear rich fields and bring the country into pasture, or else to destroy wild beasts and enrich themselves with the booty; for hunting with the pitfall and with fire came into use before the practice of enclosing the land with toils and stirring it with dogs. Whatever the fact is, from whatever cause the heat of flame had swallowed up the forests with a frightful crackling from their very roots and had thoroughly baked the earth with fire, there would run from the boiling veins and collect into the hollows of the ground a stream of silver and gold, as well as of copper and lead. And when they saw these afterwards cool into lumps and glitter on the earth with a brilliant gleam, they would lift them up attracted by the bright and polished lustre, and they would see them to be moulded in a shape the same as the outline of the cavities in which each lay. Then it would strike them that these might be melted by heat and cast in any form or shape soever, and might by hammering out be brought to tapering points of any degree of sharpness and fineness, so as to furnish them with tools and enable them to cut the forests and hew timber and plane smooth the planks, and also to drill and pierce and bore. And they would set about these works just as much with silver and gold at first as with the overpowering strength of stout copper, but in vain, since their force would fail and give way and not be able like copper to stand the severe strain. At that time copper was in higher esteem and gold would lie neglected on account of its uselessness, with its dull blunted edge; now copper lies neglected, gold has mounted up to the highest place of honour. Thus time as it goes round changes the seasons of things. That which was in esteem falls at length into utter disrepute; and then another thing mounts up and issues out of its degraded state and every day is more and more coveted and blossoms forth high in honour when discovered and is in marvellous repute with men.

And now, Memmius, it is easy for you to find out by yourself in what way the nature of iron was discovered. Arms of old were hands, nails and teeth, and stones and boughs broken off from the forests, and flame and fire, as soon as they had become known. Afterwards the force of iron and copper was discovered; and the use of copper was known before that of iron, as its nature is easier to work and it is found in greater quantity. With copper they would labour the soil of the earth, with copper stir up the billows of war and deal about wide-gaping wounds and seize cattle and lands; for everything defenceless and unarmed would readily yield to them with arms in hand. Then by slow steps the sword of iron gained ground and the make of the copper sickle became a byword; and with iron they began to plough through the earth's soil, and the struggles of wavering war were rendered equal. And the custom of mounting in arms on the back of a horse and guiding him with reins and shewing prowess with the right hand is older than that of tempting the risks of war in a two-horsed chariot; and yoking a pair of horses is older than yoking four or mounting in arms scythed chariots. Next the Poeni taught the lucan kine with towered body, hideous of aspect, with snake-like hand, to endure the

wounds of war and to disorder the mighty ranks of Mars. Thus sad discord begat one thing after another, to affright nations of men under arms, and every day made some addition to the terrors of war.

ORIGIN OF THE TEXTILE ARTS

A garment tied on the body was in use before a dress of woven stuff. Woven stuff comes after iron, because iron is needed for weaving a web; and in no other way can such finely polished things be made, as heddles and spindles, shuttles and ringing yarnbeams. And nature impelled men to work up the wool before womankind; for the male sex in general far excels the other in skill and is much more ingenious; until the rugged countrymen so upbraided them with it, that they were glad to give it over into the hands of the women and take their share in supporting hard toil, and in such hard work hardened body and hands.

3. TABLE OF STRATIFIED ROCKS

Adapted from E. RAY LANKESTER, "Extinct Animals," page 60

QUATERNARY	<i>The Numbers in this Column Indicate Thickness in Feet</i>	MAN
	RECENT AND PLEISTOCENE 200	
TERTIARY (CENOZOIC)	PLIOCENE 250	GREAT MAMMALS
	MIOCENE 1,000	
	OLIGOCENE 600	
	EOCENE 800	
SECONDARY (MESOZOIC)	CRETACEOUS 2,500	GREAT REPTILES
	JURASSIC 5,000	
	TRIASSIC 3,000	
PRIMARY (PALAEOZOIC)	PERMIAN 1,500	GREAT AMPHIBIANS
	CARBONIFEROUS 12,000	
	DEVONIAN 5,000	MAILED FISHES
	SILURIAN 7,000	
	ORDOVICIAN 15,000	INVERTEBRATES MOLLUSCS CRUSTACEANS WORMS
	CAMBRIAN 12,000	
	ARCHAEAN 50,000	

4. HOW THE HISTORY OF THE PAST IS READ¹

By F. A. LUCAS

Very little of really ancient history is to be learned from books, very little of it is even recorded in written language. The stories of Assyria and Babylonia, it is true, are partly deciphered from strange characters impressed on tablets of clay and partly from inscriptions carved on monuments and statues. But Assyria and Babylonia were highly civilized nations; and while they may be ancient as we compute time, they are modern if judged by nature's standards, and there are many far older races that had no written language and left no inscribed tablets nor sculptured stones to tell of their life and achievements. For any knowledge of the history of these very ancient peoples we are wholly dependent upon such articles of every-day use as were made of materials sufficiently enduring to last through long centuries of time. And in like manner our knowledge of the many animals that lived still more remotely is derived mainly from the study of their hard parts, such as shells, teeth, or bones, that have been preserved for countless ages in the shape of fossils; and this study of the life of the past is known as Paleontology.

Literally, a fossil is "something dug up;" but in actual use the word has a much more restricted meaning. No one would think of calling diamonds, or gold, or fire-clay fossils, although they are things dug up; neither would we speak of the bones of the horse Farmer Jones buried in the pasture twenty years ago as fossils. The term is applied only to the remains of animals or plants that have been buried by natural causes and preserved for long periods of time, or to such indications of former life as natural casts and impressions of shells, leaves, footprints, and the like.

In a few very exceptional cases animals have been preserved entire, but this is where they have lived at a comparatively recent date, and were entombed in ice or frozen ground immediately after death. A few specimens of the mammoth and one or two of the woolly rhinoceros are all that have been thus preserved, and both these animals lived in Europe with early man; and although this was thousands of years ago, from a geological standpoint it is but as yesterday.

Even the hard parts of animals have become changed by the dissolving of some portions—particularly of the animal matter—and the filtering in of other substances, until through this process of replacement the shell or bone has become changed to stone, or, as it is often termed, petrified; and the older these objects are and the deeper they lie in the rocks the more complete are the changes they have undergone.

¹Chapter 1 of F. A. Lucas, *Animals Before Man in North America*, D. Appleton and Company, New York, 1902. By permission.

So completely, though gradually, do these changes take place, that even the minute structure of wood or bone may be seen under the microscope, the exact shape of each little cell having been retained, although the original material of which it was composed has been replaced by silica, or flint, as it is more familiarly called.

Since these changes require certain favorable conditions and take place very slowly, only objects that retain their shape for a considerable time can be thus altered; so, flesh can never be turned into stone, and consequently there is no such thing as a "petrified body."

The familiar experiment of soaking a bone in weak muriatic acid shows how much animal matter there is in a skeleton; and it will surprise any one who will try a tooth—that of a horse, for example—in place of a bone, to find how much of this, too, is made up of gristle-like material. There is so much of this in the tusks of elephants or teeth of sperm whales that they can be made into gelatin, and this might be used for making elephant or whale jelly. This is the reason why the tusks of ancient elephants are so rarely found; the soft material of the tusks washed out so much more rapidly than mineral substances filtered in to replace it, that they crumbled to pieces and disappeared. There is another class of fossils in a measure intermediate between the actual preservation of a bone or shell and its mere impression; and this is where such objects as the shell of a crab or the leaf of a tree have been pressed extremely thin, but have left their exact outline in color on the rock, as if painted by the hand of nature. This color-printing is usually due to the presence of iron in the soil in which the object was buried, and its combination with organic matter makes a stain.

But if flesh and animals of soft texture perish completely so far as actual substance is concerned, the impressions such objects made in the sand or mud on which they rested and the casts formed by the mud which settled about or in them may remain; and it is wonderful to find that such delicate creatures as soft-bodied jellyfish, or sea-nettles, have left traces of their former presence even in some of the most ancient rocks. This, of course, could happen only where the water was quiet and soft mud plentiful, so that these delicate animals were buried immediately after death. If we imagine a host of jellyfish resting on the shallows of some quiet little Cambrian bay, and that into this poured a river suddenly made turbid with the mud created by some local inland rain, it will give us some hint as to how their preservation might take place.

The sea to-day swarms with jellyfish, or *Medusæ*, especially in warm latitudes, and so it must have done in past ages; that "fossil jellyfish" should be found only in one or two favored localities shows how rarely just the right conditions for their preservation occurred.

Insects—that is, the imprints of insects—have been found by the thousand in the soft, fine-grained shale of Florissant, Colo.; and many others, including such familiar forms as cockroaches and dragon-flies, have been taken from the great storehouse of wonderful fossils, the lithographic stone quarries of Solen-

hofen, Bavaria. And if traces of such delicate and fragile creatures as these have been thus preserved, it is not surprising to find imprints of feathers and of the tough hides of reptiles, even when not armed with plates and spines of bone; and from these we may learn much as to the covering of these bygone animals.

There is still another class of impressions which furnishes assistance in reading the history of the past, and these are footprints. As children we may have delighted in tales of hunters tracking their game through the forest, or of Indians following the faint trail of fleeing enemies; while still more recently we may have read with equal interest Mr. Seton-Thompson's stories, and followed the tracks of Wab or Molly along the margin of the page. In much the same manner the paleontologist patiently follows the trails of long-vanished animals that ages ago passed over the sands of Time and out of existence. For, as the animals of to-day leave their footmarks beside the pond in the meadow, on the sands of the seashore, or along the margin of the river, just so the creatures of the past left their imprints on the sand or in the mud, to harden into stone and bear an indelible record of the life of other days. It is not only the larger animals that left this record in the rocks, but scores of smaller, more insignificant creatures—crabs, shell-fish, and even insects. Many of these marks have been read by comparing them with the impressions left by existing animals as they crawled over mud and sand, or over wet plaster of Paris; but now and then we come upon markings quite different from those made by any animal with which we are acquainted. In such cases, knowing the kind of tracks made by living animals and the manner in which they move their legs, it is necessary to cast about for some fossil form whose feet can be made to fit the impressions, and in this way were interpreted the markings on Cambrian rocks now ascribed to trilobites.

If the tracks of trilobites were puzzling because they were different from those made by any modern animals, those made by the great reptiles called dinosaurs were long misinterpreted for precisely the opposite reason. Ordinarily the feet of different groups of animals are constructed on different plans, so that footprints may show not only whether they were made by mammals, birds, reptiles, or batrachians, but even indicate the particular division to which the individual making them belonged. But the feet of some dinosaurs were so much like those of birds that for many years the tracks made by them were ascribed to gigantic birds. Close observers, however, pointed out that some of the finest impressions showed that the texture of the skin was quite different from that covering the feet of birds, while in most cases the bones of the toes were shorter and heavier, and subsequent discoveries have made it clear that these footprints are those of dinosaurs.

Very often tracks are all we have to tell that some animals ever existed, for their bones were either destroyed or lie buried deep in the rocks in places now inaccessible. A well-known instance is that of the famous footprints in the red sandstone of the Connecticut Valley, which bear testimony of the pre-

sence of a host of animals, great and small, but two or three of which have ever come to light. When these tracks were made, a long, narrow bay or estuary ran northward from Long Island Sound, and the rocks tell that at times the shores were left dry to bake in the sun, and again that they were overflowed by water, sweeping down quantities of mud and sand, filling up all impressions, and making casts of the tracks of those creatures that had wandered by the waterside.

How fossils are laboriously gathered and patiently prepared are stories by themselves, but stories that in the present instance may be passed by; what does concern us is the method by which these characters of stone are made to tell the story of the past life of our continent. It is not so many years ago that fossils were looked upon as mere "sports of nature," interesting from their resemblances in some cases to shells or bones, but having no meaning whatever. A little later their real nature was acknowledged, but they were regarded as "medals of creation," marking various stages in the history of the world, but of importance mainly for the identification of strata and determining the distribution of rocks. Now, however, it is recognized that fossils do not merely mark different epochs in the history of the past, but that only by their aid can we determine the relationships that animals bear to one another, and only through them can we hope to trace the development and distribution of living things.

The student of the past has at his command the teeth and bones of vertebrates, sometimes complete skeletons, their footprints, and, more rarely, imprints of their coverings or even outlines of their forms. Of invertebrates, there are shells or casts of shells, the hard coverings of such creatures as crabs, impressions of soft animals like jellyfishes, and the trails made by these various creatures as they crept over the shore. Fossilized logs and seeds, clean-cut impressions of leaves, rushes, and seaweeds, combine to tell the plant-life of the ancient world, while the rocks in which all these are preserved add their information to that of the fossils. And with the aid of all this material it is possible to picture plant and animal life as it was at various epochs of the world's history, although these pictures are, of necessity, more or less incomplete and lacking in details.

The story of the past is read as a Chinese book *seems* to be, from the end backward, and it is necessary to study not only the structure of animals now living, but their appearance and habits, in order to understand the meanings of the fragments of bone from which we must derive our knowledge of the animals that have long ceased to be. Even with a good knowledge of modern animals it is often a difficult matter to tell the relationships, habits, and appearance of many extinct forms, as they were so different from any now living that we have no term of comparison. Still, careful research has done much within the last twenty-five years to increase our knowledge, not merely by discovering new animals, but by the finding of more complete specimens of those already known to us by fragments. Fortunately, too, for the student,

while the majority of living animals differ more or less from those of the past, there are a few of the old-fashioned types still remaining to throw some light on those that have passed away.

From the animals and plants we are able to tell what the climate was at different periods; for when, in the rocks of Wyoming, for example, we find fossil palms resembling those now living in the tropics, or a breadfruit-tree turns up in California, we naturally infer that the climate of that part of the world was very much warmer then than now. So the former presence in Greenland of forest trees similar to those now growing in New York indicates that the climate of the entire globe was once milder. And if remains of great reptiles are found associated with plants, these inferences are strengthened, for the reptiles of to-day have their headquarters in warm countries, and large forms never cross the line of frost.

On the other hand, the bones of reindeer in southern Europe, and those of musk-oxen in Kentucky, tell of a time when these places were far colder than now, and that their tale is true we know from the testimony left by the great ice-sheets that have given their name to the Glacial period. More than this, since the bones are those of species still living, we know that this cold period could not have occurred so very long ago.

Sometimes we may even go a little further than this, and tell what the weather was at some particular time; there are prints of rain-drops, and these may even show the direction of the wind, casts of gaping cracks in the sun-dried mud, telling of long drought, and marks left by the rippling waves as the tide went out, speaking of gentle breezes and fair weather. It is always well to have corroborative evidence in doubtful cases, for if Nature does not exactly play tricks on us, her messages, like those of the Delphic oracle, are occasionally obscure, and capable of being translated in more ways than one.

Cuvier inferred from the bones of the elephant and rhinoceros that at the time they lived Europe rejoiced in a warm climate; but later discoveries showed that these animals were clothed in fur and fitted to endure the cold.

In cases such as these, plants furnish reliable testimony as to climate, for they are less adaptive than animals, or show their adaptation much more plainly. When we go north we find the trees growing smaller and smaller, until finally they disappear; but the reindeer and musk-ox are large animals, and the polar bear and Greenland whale even larger than their tropical relatives.

And if fossils tell what the climate was while the rocks in which they are contained were forming, the rocks, on the other hand, may show *why* the climate changed, and with it the plant and animal life of that portion of the globe. The upheaval of mountain ranges has cut off warm and moisture-laden winds, transforming verdure-clad plains into arid wastes; the slow rise of great masses of land has cast a chill over vast areas, transforming those species that—we know not why—can respond to changed conditions, pushing southward, or blotting out of existence those that can not. The mountain range may count-

less ages ago have been leveled to a plain, the continent again sunk beneath the sea and again risen, but from the rocks and fossils we may learn the story of these changes, set the former boundaries of the land, and people the earth with its long-vanished life.

If the rocks from two widely separated localities are found to contain the same or even similar species of fossil land animals, it is to be inferred that these rocks were formed at about the same period of time, and that there was a land connection between the two places. These are very general propositions, but in actual use there are several factors to be taken into consideration, and with invertebrates the case is yet more complicated.

If the fossils are very different in their nature, we may be sure that the rocks were separated either by time or space; and if the fossils are those of mammals, they will probably tell which of these two possibilities is a probability. For here it may be said that the different kinds of animals keep as it were different kinds of time, the low animals of simple structure seeming to change much more slowly than those higher in the scale. This is really what might be expected, for the more highly organized a creature the more susceptible should it be to changes of any kind, although another factor probably plays a part here, the fact that the simpler animals as a rule move about less, and live now, and did in the past, under more uniform conditions than their relatives. And among animals the mammals, after they became fairly established, changed the most rapidly of all, so that, aside from the marsupials, there is not now living a single family that dates back to the Eocene. The birds of that period were very much like those of to-day, while many families of fishes, and genera even, go back to the Cretaceous. So mammals indicate changes of time and of surrounding conditions much more exactly than other animals. Fresh-water shells, or, better yet, fresh-water fishes, furnish the best testimony as to former land connection between countries now separated by the sea; for, owing to their mode of life, these spread but slowly, and long lapses of time were necessary in order that they might be carried from one region to another.

To apply these facts to the history of our own country, it may be said that fishes still living hint at a former union between North America, Asia, and Europe, while the testimony of fossil mammals is to the effect that Europe and this continent were united just before, or during, the Eocene period. Fossil elephants and mastodons speak of an early connection between Asia and America, while existing animals show that very recently (geologically speaking) Alaska and Siberia were connected by a land bridge in the vicinity of Bering Straits.

As for the testimony of the rocks themselves, thick beds tell of long periods of quiet, when changes in the earth's crust were few and slow, while thin beds of rock speak of frequent changes of level. Fine-grained limestones indicate the presence of lime-secreting creatures such as corals and crinoids, or perhaps of those stony-jointed plants, the so-called nullipores, once counted with the

corals, and, like them, aids in reef-building. Fine shales tell of soft mud washed from the adjacent shore and deposited in quiet waters, while coarse-grained sandstones and coarser conglomerates were laid down nearer shore, where the wash of waves and sweep of tides and currents carried away all finer particles, to deposit them farther out at sea.

Such is a general outline of the data available for writing the history of the past, and such the methods by which these data have been interpreted and the scattered parts woven into a connected whole. That many mistakes have been made in doing this is undeniable, nor may we say that all have been corrected. But the same may be said of any history, even of the record of current events, and if errors are pardonable, surely the historian may be forgiven who is writing of events that took place not hundreds, but thousands and millions, of years ago. It must be borne in mind, too, that the student of the past is sadly hampered by what Darwin called the imperfection of the record, the utter lack of anything like a continuous transcript of past life. Very many animals were by their very structure prevented from leaving any vestige of their former presence, and the vast majority of those that could, perished under such conditions that they failed to do so. The greater part of all fossils are inaccessible, for we can only reach those whose ancient burial-places have been laid bare by the wearing away of overlying rock, or where the edges of strata have been cut through by rivers, or exposed by the mighty thrust of forces that have converted plains into mountains. And even after events like these had laid bare the rocky pages wherein the story of the past is written, the hand of Nature, with the selfsame means, has ruthlessly erased all traces of the record before they had been seen by the eye of man.

There is perhaps no group of animals that illustrates this imperfection of the record so well as birds. There are living to-day not less than 12,000 species, and half of these belong to one group, the Passeres, or perching birds. The ancestors of some of these were living at the time camels, horses, and elephants were among the common animals of North America; but if we go back to the Eocene we find the group represented in our continent by just three specimens, and two of these seem to have been much like modern birds. The Cretaceous has yielded more specimens and more species, but the birds of that day were totally unlike those of the Eocene, for they were birds with teeth, and we can not trace the connection between them. And here the record ceases, so far as North America is concerned, for back of that we have absolutely nothing. And yet birds there were, because our toothed water-fowl represent two groups, one of which had become so specialized for aquatic life that it had lost the power of flight, and almost lost every vestige of wings. The older rocks (Jurassic) of Europe have yielded two birds, besides a single feather, and these differ as widely from our toothed species as do those from the birds of to-day. The wonder is, not that we know so little of the life of the past, but that we know so much.

5. THE STRUGGLE FOR EXISTENCE AND NATURAL SELECTION¹

By CHARLES DARWIN

Before entering on the subject of this chapter I must make a few preliminary remarks to show how the struggle for existence bears on natural selection. It has been seen in the last chapter that among organic beings in a state of nature there is some individual variability: indeed, I am not aware that this has ever been disputed. It is immaterial for us whether a multitude of doubtful forms be called species or sub-species or varieties; what rank, for instance, the two or three hundred doubtful forms of British plants are entitled to hold, if the existence of any well-marked varieties be admitted. But the mere existence of individual variability and of some few well-marked varieties, though necessary as the foundation for the work, helps us but little in understanding how species arise in nature. How have all those exquisite adaptations of one part of the organization to another part, and to the conditions of life, and of one organic being to another being, been perfected? We see these beautiful co-adaptations most plainly in the woodpecker and the mistletoe; and only a little less plainly in the humblest parasite which clings to the hairs of a quadruped or feathers of a bird; in the structure of the beetle which dives through the water; in the plumed seed which is wafted by the gentlest breeze; in short, we see beautiful adaptations everywhere and in every part of the organic world.

Again, it may be asked, how is it that varieties, which I have called incipient species, become ultimately converted into good and distinct species, which in most cases obviously differ from each other far more than do the varieties of the same species? How do those groups of species, which constitute what are called distinct genera and which differ from each other more than do the species of the same genus, arise? All these results, as we shall more fully see in the next chapter, follow from the struggle for life. Owing to this struggle, variations, however slight and from whatever cause proceeding, if they be in any degree profitable to the individuals of a species, in their infinitely complex relations to other organic beings and to their physical conditions of life, will tend to the preservation of such individuals, and will generally be inherited by the offspring. The offspring, also, will thus have a better chance of surviving, for, of the many individuals of any species which

¹Chapter 3, "Struggle for Existence," and summary of Chapter 4, "Natural Selection: or the Survival of the Fittest," of *The Origin of Species*, by Charles Darwin, first published in 1859.

are periodically born, but a small number can survive. I have called this principle, by which each slight variation, if useful, is preserved, by the term natural selection, in order to mark its relation to man's power of selection. But the expression often used by Mr. Herbert Spencer, of the *Survival of the Fittest*, is more accurate, and is sometimes equally convenient. We have seen that man by selection can certainly produce great results, and can adapt organic beings to his own uses, through the accumulation of slight but useful variations, given to him by the hand of Nature. But Natural Selection, we shall hereafter see, is a power incessantly ready for action, and is as immeasurably superior to man's feeble efforts as the works of Nature are to those of Art.

We will now discuss in a little more detail the struggle for existence. In my future work this subject will be treated, as it well deserves, at greater length. The elder De Candolle and Lyell have largely and philosophically shown that all organic beings are exposed to severe competition. In regard to plants, no one has treated this subject with more spirit and ability than W. Herbert, Dean of Manchester, evidently the result of his great horticultural knowledge. Nothing is easier than to admit in words the truth of the universal struggle for life, or more difficult—at least I found it so—than constantly to bear this conclusion in mind. Yet unless it be thoroughly ingrained in the mind, the whole economy of nature, with every fact on distribution, rarity, abundance, extinction, and variation, will be dimly seen or quite misunderstood. We behold the face of nature bright with gladness, we often see superabundance of food; we do not see, or we forget, that the birds which are idly singing round us mostly live on insects or seeds, and are thus constantly destroying life; or we forget how largely these songsters, or their eggs, or their nestlings, are destroyed by birds and beasts of prey; we do not always bear in mind, that, though food may be now superabundant, it is not so at all seasons of each recurring year.

THE TERM, STRUGGLE FOR EXISTENCE, USED IN A LARGE SENSE

I should premise that I use this term in a large and metaphorical sense, including dependence of one being on another, and including (which is more important) not only the life of the individual, but success in leaving progeny. Two canine animals, in a time of dearth, may be truly said to struggle with each other which shall get food and live. But a plant on the edge of a desert is said to struggle for life against the drought, though more properly it should be said to be dependent on the moisture. A plant which annually produces a thousand seeds, of which only one of an average comes to maturity, may be more truly said to struggle with the plants of the same and other kinds which already clothe the ground. The mistletoe is dependent on the apple and a few other trees, but can only in a far-fetched sense be said to struggle with these trees, for, if too many of these parasites grow on the same tree, it lan-

guishes and dies. But several seedling mistletoes, growing close together on the same branch, may more truly be said to struggle with each other. As the mistletoe is disseminated by birds, its existence depends on them; and it may metaphorically be said to struggle with other fruit-bearing plants, in tempting the birds to devour and thus disseminate its seeds. In these several senses, which pass into each other, I use for convenience' sake the general term of Struggle for Existence.

GEOMETRICAL RATIO OF INCREASE

A struggle for existence inevitably follows from the high rate at which all organic beings tend to increase. Every being, which during its natural lifetime produces several eggs or seeds, must suffer destruction during some period of its life, and during some season or occasional year; otherwise, on the principle of geometrical increase, its numbers would quickly become so inordinately great that no country could support the product. Hence, as more individuals are produced than can possibly survive, there must in every case be a struggle for existence, either one individual with another of the same species, or with the individuals of distinct species, or with the physical conditions of life. It is the doctrine of Malthus applied with manifold force to the whole animal and vegetable kingdoms; for in this case there can be no artificial increase of food, and no prudential restraint from marriage. Although some species may be now increasing, more or less rapidly, in numbers, all cannot do so, for the world would not hold them.

There is no exception to the rule that every organic being naturally increases at so high a rate, that, if not destroyed, the earth would soon be covered by the progeny of a single pair. Even slow-breeding man has doubled in twenty-five years, and at this rate, in less than a thousand years, there would literally not be standing-room for his progeny. Linnaeus has calculated that if an annual plant produced only two seeds—and there is no plant so unproductive as this—and their seedlings next year produced two, and so on, then in twenty years there would be a million plants. The elephant is reckoned the slowest breeder of all known animals, and I have taken some pains to estimate its probable minimum rate of natural increase; it will be safest to assume that it begins breeding when thirty years old, and goes on breeding till ninety years old, bringing forth six young in the interval, and surviving till one hundred years old; if this be so, after a period of from 740 to 750 years there would be nearly nineteen million elephants alive, descended from the first pair.

But we have better evidence on this subject than mere theoretical calculations, namely, the numerous recorded cases of the astonishingly rapid increase of various animals in a state of nature, when circumstances have been favorable to them during two or three following seasons. Still more striking is the evidence from our domestic animals of many kinds which have run wild

in several parts of the world; if the statements of the rate of increase of slow-breeding cattle and horses in South America, and latterly in Australia, had not been well authenticated, they would have been incredible. So it is with plants; cases could be given of introduced plants which have become common throughout whole islands in a period of less than ten years. Several of the plants, such as the cardoon and a tall thistle, which are now the commonest over the wide plains of La Plata, clothing square leagues of surface almost to the exclusion of every other plant, have been introduced from Europe; and there are plants which now range in India, as I hear from Dr. Falconer, from Cape Comorin to the Himalaya, which have been imported from America since its discovery. In such cases, and endless others could be given, no one supposes that the fertility of the animals or plants has been suddenly and temporarily increased in any sensible degree. The obvious explanation is that the conditions of life have been highly favorable, and that there has consequently been less destruction of the old and young, and that nearly all the young have been enabled to breed. Their geometrical ratio of increase, the result of which never fails to be surprising, simply explains their extraordinarily rapid increase and wide diffusion in their new homes.

In a state of nature almost every full-grown plant annually produces seed, and among animals there are very few which do not annually pair. Hence we may confidently assert that all plants and animals are tending to increase at a geometrical ratio—that all would rapidly stock every station in which they could anyhow exist—and that this geometrical tendency to increase must be checked by destruction at some period of life. Our familiarity with the larger domestic animals tends, I think, to mislead us; we see no great destruction falling on them, but we do not keep in mind that thousands are annually slaughtered for food, and that in a state of nature an equal number would have somehow to be disposed of.

The only difference between organisms which annually produce eggs or seeds by the thousand, and those which produce extremely few, is, that the slow breeders would require a few more years to people, under favorable conditions, a whole district, let it be ever so large. The condor lays a couple of eggs and the ostrich a score, and yet in the same country the condor may be the more numerous of the two. The Fulmar petrel lays but one egg, yet it is believed to be the most numerous bird in the world. One fly deposits hundreds of eggs, and another, like the hippobosca, a single one. But this difference does not determine how many individuals of the two species can be supported in a district. A large number of eggs is of some importance to those species which depend on a fluctuating amount of food, for it allows them rapidly to increase in numbers. But the real importance of a large number of eggs or seed is to make up for much destruction at some period of life; and this period in the great majority of cases is an early one. If an animal can in any way protect its own eggs or young, a small number may be produced, and yet the average stock be fully kept up; but if many eggs or

young are destroyed, many must be produced, or the species will become extinct. It would suffice to keep up the full number of a tree, which lived on an average for a thousand years, if a single seed were produced once in a thousand years, supposing that this seed were never destroyed and could be insured to germinate in a fitting place; so that, in all cases, the average number of any animal or plant depends only indirectly on the number of its eggs or seeds.

In looking at Nature, it is most necessary to keep the foregoing considerations always in mind—never to forget that every single organic being may be said to be striving to the utmost to increase in numbers; that each lives by a struggle at some period of its life; that heavy destruction inevitably falls either on the young or old during each generation or at recurrent intervals. Lighten any check, mitigate the destruction ever so little, and the number of the species will almost instantaneously increase to any amount.

NATURE OF THE CHECKS TO INCREASE

The causes which check the natural tendency of each species to increase are most obscure. Look at the most vigorous species; by as much as it swarms in numbers, by so much will it tend to increase still further. We know not exactly what the checks are, even in a single instance. Nor will this surprise any one who reflects how ignorant we are on this head, even in regard to mankind, although so incomparably better known than any other animal. This subject of the checks to increase has been ably treated by several authors, and I hope in a future work to discuss it at considerable length, more especially in regard to the feral animals of South America. Here I will make only a few remarks, just to recall to the reader's mind some of the chief points. Eggs or very young animals seem generally to suffer most, but this is not invariably the case. With plants there is a vast destruction of seeds, but from some observations which I have made it appears that the seedlings suffer most from germinating in ground already thickly stocked with other plants. Seedlings, also, are destroyed in vast numbers by various enemies; for instance, on a piece of ground three feet long and two wide, dug and cleared, and where there could be no choking from other plants, I marked all the seedlings of our native weeds as they came up, and out of 357 no less than 295 were destroyed, chiefly by slugs and insects. If turf which has long been mown (and the case would be the same with turf closely browsed by quadrupeds) be let to grow, the more vigorous plants gradually kill the less vigorous, though fully grown plants; thus, out of twenty species grown on a little plot of mown turf (three feet by four), nine species perished, from the other species being allowed to grow up freely.

The amount of food for each species, of course, gives the extreme limit to which each can increase; but very frequently it is not the obtaining food, but the serving as prey to other animals, which determines the average number

of a species. Thus, there seems to be little doubt that the stock of partridges, grouse, and hares on any large estate depends chiefly on the destruction of vermin. If not one head of game were shot during the next twenty years in England, and, at the same time, if no vermin were destroyed, there would, in all probability, be less game than at present, although hundreds of thousands of game animals are now annually shot. On the other hand, in some cases, as with the elephant, none are destroyed by beasts of prey; for even the tiger in India most rarely dares to attack a young elephant protected by its dam.

Climate plays an important part in determining the average numbers of a species, and periodical seasons of extreme cold or drought seem to be the most effective of all checks. I estimated (chiefly from the greatly reduced numbers of nests in the spring) that the winter of 1854-55 destroyed four-fifths of the birds in my own grounds; and this is a tremendous destruction, when we remember that ten per cent. is an extraordinarily severe mortality from epidemics with man. The action of climate seems at first sight to be quite independent of the struggle for existence; but in so far as climate chiefly acts in reducing food, it brings on the most severe struggle between the individuals, whether of the same or of distinct species, which subsist on the same kind of food. Even when climate, for instance extreme cold, acts directly, it will be the least vigorous individuals, or those which have got least food through the advancing winter, which will suffer the most. When we travel from south to north, or from a damp region to a dry, we invariably see some species gradually getting rarer and rarer, and finally disappearing; and the change of climate being conspicuous, we are tempted to attribute the whole effect to its direct action. But this is a false view; we forget that each species, even where it most abounds, is constantly suffering enormous destruction at some period of its life, from enemies or from competitors for the same place and food; and if these enemies or competitors be in the least degree favored by any slight change of climate, they will increase in numbers; and as each area is already fully stocked with inhabitants, the other species must decrease. When we travel southward and see a species decreasing in numbers, we may feel sure that the cause lies quite as much in other species being favored, as in this one being hurt. So it is when we travel northward, but in a somewhat lesser degree, for the number of species of all kinds, and therefore of competitors, decreases northward, or in ascending a mountain, we far oftener meet with stunted forms, due to the directly injurious action of climate, than we do in proceeding southward or in descending a mountain. When we reach the arctic regions, or snow-capped summits, or absolute deserts, the struggle for life is almost exclusively with the elements.

That climate acts in main part indirectly by favoring other species, we clearly see in the prodigious number of plants which in our gardens can perfectly well endure our climate, but which never become naturalized, for they cannot compete with our native plants nor resist destruction by our native animals.

When a species, owing to highly favorable circumstances, increases inordinately in numbers in a small tract, epidemics—at least, this seems generally to occur with our game animals—often ensue; and here we have a limiting check independent of the struggle for life. But even some of these so-called epidemics appear to be due to parasitic worms, which have from some cause, possibly in part through facility of diffusion among the crowded animals, been disproportionately favored; and here comes in a sort of struggle between the parasite and its prey.

On the other hand, in many cases, a large stock of individuals of the same species, relatively to the numbers of its enemies, is absolutely necessary for its preservation. Thus we can easily raise plenty of corn and rape-seed, etc., in our fields, because the seeds are in great excess compared with the number of birds which feed on them; nor can the birds, though having a superabundance of food at this one season, increase in number proportionally to the supply of seed, as their numbers are checked during the winter; but anyone who has tried knows how troublesome it is to get seed from a few wheat or other such plants in a garden; I have in this case lost every single seed. This view of the necessity of a large stock of the same species for its preservation, explains, I believe, some singular facts in nature, such as that of very rare plants being sometimes extremely abundant, in the few spots where they do exist; and that of some social plants being social, that is abounding in individuals, even on the extreme verge of their range. For in such cases we may believe that a plant could exist only where the conditions of its life were so favorable that many could exist together, and thus save the species from utter destruction. I should add that the good effects of intercrossing, and the ill-effects of close interbreeding, no doubt come into play in many of these cases; but I will not here enlarge on this subject.

COMPLEX RELATIONS OF ALL ANIMALS AND PLANTS TO EACH OTHER IN THE STRUGGLE FOR EXISTENCE

Many cases are on record showing how complex and unexpected are the checks and relations between organic beings, which have to struggle together in the same country. I will give only a single instance, which, though a simple one, interested me. In Staffordshire, on the estate of a relation, where I had ample means of investigation, there was a large and extremely barren heath, which had never been touched by the hand of man; but several hundred acres of exactly the same nature had been enclosed twenty-five years previously and planted with Scotch fir. The change in the native vegetation of the planted part of the heath was most remarkable, more than is generally seen in passing from one quite different soil to another; not only the proportional numbers of the heath-plants were wholly changed, but twelve species of plants (not counting grasses and carices) flourished in the plantations, which could not be found on the heath. The effect on the insects must have been still

greater, for six insectivorous birds were very common in the plantations, which were not to be seen on the heath; and the heath was frequented by two or three distinct insectivorous birds. Here we see how potent has been the effect of the introduction of a single tree, nothing whatever else having been done, with the exception of the land having been enclosed, so that cattle could not enter. But how important an element enclosure is, I plainly saw near Farnham, in Surrey. Here there are extensive heaths, with a few clumps of old Scotch firs on the distant hilltops; within the last ten years large spaces have been enclosed, and self-sown firs are now springing up in multitudes, so close together that all cannot live. When I ascertained that these young trees had not been sown or planted, I was so much surprised at their numbers that I went to several points of view, whence I could examine hundreds of acres of the unenclosed heath, and literally I could not see a single Scotch fir, except the old planted clumps. But on looking closely between the stems of the heath, I found a multitude of seedlings and little trees which had been perpetually browsed down by the cattle. In one square yard, at a point some hundred yards distant from one of the old clumps, I counted thirty-two little trees; and one of them, with twenty-six rings of growth, had, during many years, tried to raise its head above the stems of the heath, and had failed. No wonder that, as soon as the land was enclosed, it became thickly clothed with vigorously growing young firs. Yet the heath was so extremely barren and so extensive that no one would ever have imagined that cattle would have so closely and effectually searched it for food.

Here we see that cattle absolutely determine the existence of the Scotch fir; but in several parts of the world insects determine the existence of cattle. Perhaps Paraguay offers the most curious instance of this; for here neither cattle nor horses nor dogs have ever run wild, though they swarm southward and northward in a feral state; and Azara and Rengger have shown that this is caused by the greater number in Paraguay of a certain fly, which lays its eggs in the navels of these animals when first born. The increase of these flies, numerous as they are, must be habitually checked by some means, probably by other parasitic insects. Hence, if certain insectivorous birds were to decrease in Paraguay, the parasitic insects would probably increase; and this would lessen the number of the navel-frequenting flies—then cattle and horses would become feral, and this would certainly greatly alter (as indeed I have observed in parts of South America) the vegetation; this again would largely affect the insects; and this, as we have just seen in Staffordshire, the insectivorous birds, and so onward in ever-increasing circles of complexity. Not that under nature the relations will ever be as simple as this. Battle within battle must be continually recurring with varying success; and yet in the long run the forces are so nicely balanced that the face of nature remains for long periods of time uniform, though assuredly the merest trifle would give the victory to one organic being over another. Nevertheless, so profound is our ignorance, and so high our presumption, that we marvel when we hear

of the extinction of an organic being; and as we do not see the cause, we invoke cataclysms to desolate the world, or invent laws on the duration of the forms of life!

I am tempted to give one more instance showing how plants and animals, remote in the scale of nature, are bound together by a web of complex relations. I shall hereafter have occasion to show that the exotic *Lobelia fulgens* is never visited in my garden by insects, and consequently, from its peculiar structure, never sets a seed. Nearly all our orchidaceous plants absolutely require the visits of insects to remove their pollen-masses and thus to fertilize them. I find from experiments that humble-bees are almost indispensable to the fertilization of the heartsease (*Viola tricolor*), for other bees do not visit this flower. I have also found that the visits of bees are necessary for the fertilization of some kinds of clover; for instance, twenty heads of Dutch clover (*Trifolium repens*) yielded 2,290 seeds, but twenty other heads, protected from bees, produced not one. Again, one hundred heads of red clover (*T. pratense*) produced 2,700 seeds, but the same number of protected heads produced not a single seed. Humble-bees alone visit red clover, as other bees cannot reach the nectar. It has been suggested that moths may fertilize the clovers; but I doubt whether they could do so in the case of the red clover, from their weight not being sufficient to depress the wing petals. Hence we may infer as highly probable that, if the whole genus of humble-bees became extinct or very rare in England, the heartsease and red clover would become very rare, or wholly disappear. The number of humble-bees in any district depends in a great measure upon the number of field-mice, which destroy their combs and nests; and Colonel Newman, who has long attended to the habits of humble-bees, believes that "more than two-thirds of them are thus destroyed all over England." Now the number of mice is largely dependent, as every one knows, on the number of cats; and Colonel Newman says, "Near villages and small towns I have found the nests of humble-bees more numerous than elsewhere, which I attribute to the number of cats that destroy the mice." Hence it is quite credible that the presence of a feline animal in large numbers in a district might determine, through the intervention first of mice and then of bees, the frequency of certain flowers in that district!

In the case of every species, many different checks, acting at different periods of life, and during different seasons or years, probably come into play; some one check or some few being generally the most potent; but all will concur in determining the average number, or even the existence of the species. In some cases it can be shown that widely different checks act on the same species in different districts. When we look at the plants and bushes clothing an entangled bank, we are tempted to attribute their proportional numbers and kinds to what we call chance. But how false a view is this! Every one has heard that when an American forest is cut down, a very different vegetation springs up; but it has been observed that ancient Indian ruins in the Southern United States, which must formerly have been cleared of trees, now

display the same beautiful diversity and proportion of kinds as in the surrounding virgin forests. What a struggle must have gone on during long centuries between the several kinds of trees, each annually scattering its seeds by the thousand; what war between insect and insect—between insects, snails, and other animals with birds and beasts of prey—all striving to increase, all feeding on each other, or on the trees, their seeds and seedlings, or on the other plants which first clothed the ground and thus checked the growth of the trees! Throw up a handful of feathers, and all fall to the ground according to definite laws; but how simple is the problem where each shall fall, compared to that of the action and reaction of the innumerable plants and animals which have determined, in the course of centuries, the proportional numbers and kinds of trees now growing on the old Indian ruins!

The dependency of one organic being on another, as of a parasite on its prey, lies generally between beings remote in the scale of nature. This is likewise sometimes the case with those which may be strictly said to struggle with each other for existence, as in the case of locusts and grass-feeding quadrupeds. But the struggle will almost invariably be most severe between the individuals of the same species, for they frequent the same districts, require the same food, and are exposed to the same dangers. In the case of varieties of the same species, the struggle will generally be almost equally severe, and we sometimes see the contest soon decided; for instance, if several varieties of wheat be sown together and the mixed seed be resown, some of the varieties which best suit the soil or climate, or are naturally the most fertile, will beat the others and so yield more seed, and will consequently in a few years supplant the other varieties. To keep up a mixed stock of even such extremely close varieties as the variously colored sweet-pease, they must be each year harvested separately, and the seed then mixed in due proportion, otherwise the weaker kinds will steadily decrease in number and disappear. So again with the varieties of sheep; it has been asserted that certain mountain varieties will starve out other mountain varieties, so that they cannot be kept together. The same result has followed from keeping together different varieties of the medicinal leech. It may even be doubted whether the varieties of any of our domestic plants or animals have so exactly the same strength, habits, and constitution, that the original proportions of a mixed stock (crossing being prevented) could be kept up for half a dozen generations, if they were allowed to struggle together, in the same manner as beings in a state of nature, and if the seed or young were not annually preserved in due proportion.

STRUGGLE FOR LIFE MOST SEVERE BETWEEN INDIVIDUALS AND VARIETIES OF THE SAME SPECIES

As the species of the same genus usually have, though by no means invariably, much similarity in habits and constitution, and always in structure, the struggle will generally be more severe between them, if they come into

competition with each other, than between the species of distinct genera. We see this in the recent extension over parts of the United States of one species of swallow, having caused the decrease of another species. The recent increase of the missel-thrush in parts of Scotland has caused the decrease of the song-thrush. How frequently we hear of one species of rat taking the place of another species under the most different climates! In Russia the small Asiatic cockroach has everywhere driven before it its great congener. In Australia the imported hive-bee is rapidly exterminating the small, stingless native bee. One species of charlock has been known to supplant another species; and so in other cases. We can dimly see why the competition should be most severe between allied forms, which fill nearly the same place in the economy of nature; but probably in no one case could we precisely say why one species has been victorious over another in the great battle of life.

A corollary of the highest importance may be deduced from the foregoing remarks, namely, that the structure of every organic being is related, in the most essential yet often hidden manner, to that of all the other organic beings, with which it comes into competition for food or residence, or from which it has to escape, or on which it preys. This is obvious in the structure of the teeth and talons of the tiger; and in that of the legs and claws of the parasite which clings to the hair on the tiger's body. But in the beautifully plumed seed of the dandelion, and in the flattened and fringed legs of the water-beetle, the relation seems at first confined to the elements of air and water. Yet the advantage of the plumed seeds no doubt stands in the closest relation to the land being already thickly clothed with other plants, so that the seeds may be widely distributed and fall on unoccupied ground. In the water-beetle, the structure of its legs, so well adapted for diving, allows it to compete with other aquatic insects, to hunt for its own prey, and to escape serving as prey to other animals.

The store of nutriment laid up within the seeds of many plants seems at first sight to have no sort of relation to other plants. But from the strong growth of young plants produced from such seeds, as pease and beans, when sown in the midst of long grass, it may be suspected that the chief use of the nutriment in the seed is to favor the growth of the seedlings, while struggling with other plants growing vigorously all around.

Look at a plant in the midst of its range! Why does it not double or quadruple its numbers? We know that it can perfectly well withstand a little more heat or cold, dampness or dryness, for elsewhere it ranges into slightly hotter or colder, damper or dryer districts. In this case we can clearly see that if we wish in imagination to give the plant the power of increasing in numbers, we should have to give it some advantage over its competitors, or over the animals which prey on it. On the confines of its geographical range, a change of constitution with respect to climate would clearly be an advantage to our plant; but we have reason to believe that only a few plants or animals range so far, that they are destroyed exclusively by the rigor of the climate.

Not until we reach the extreme confines of life, in the arctic regions or on the borders of an utter desert, will competition cease. The land may be extremely cold or dry, yet there will be competition between some few species, or between the individuals of the same species, for the warmest or dampest spots.

Hence we can see that when a plant or animal is placed in a new country, among new competitors, the conditions of its life will generally be changed in an essential manner, although the climate may be exactly the same as in its former home. If its average numbers are to increase in its new home, we should have to modify it in a different way to what we should have had to do in its native country; for we should have to give it some advantage over a different set of competitors or enemies.

It is good thus to try in imagination to give any one species an advantage over another. Probably in no single instance should we know what to do. This ought to convince us of our ignorance on the mutual relations of all organic beings; a conviction as necessary as it is difficult to acquire. All that we can do is to keep steadily in mind that each organic being is striving to increase in a geometrical ratio; that each, at some period of its life, during some season of the year, during each generation, or at intervals, has to struggle for life and to suffer great destruction. When we reflect on this struggle we may console ourselves with the full belief that the war of nature is not incessant, that no fear is felt, that death is generally prompt, and that the vigorous, the healthy, and the happy survive and multiply.

NATURAL SELECTION: SUMMARY

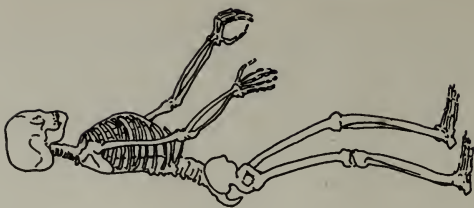
If under changing conditions of life organic beings present individual differences in almost every part of their structure, and this cannot be disputed; if there be, owing to their geometrical rate of increase, a severe struggle for life at some age, season or year, and this certainly cannot be disputed; then, considering the infinite complexity of the relations of all organic beings to each other and to their conditions of life, causing an infinite diversity in structure, constitution and habits, to be advantageous to them, it would be a most extraordinary fact if no variations had ever occurred useful to each being's own welfare, in the same manner as so many variations have occurred useful to man. But if variations useful to any organic being ever do occur, assuredly individuals thus characterized will have the best chance of being preserved in the struggle for life; and from the strong principle of inheritance, these will tend to produce offspring similarly characterized. This principle of preservation, or the survival of the fittest, I have called natural selection. It leads to the improvement of each creature in relation to its organic and inorganic conditions of life; and consequently, in most cases, to what must be regarded as an advance in organization. Nevertheless, low and simple forms will long endure if well fitted for their simple conditions of life.

Natural selection, on the principle of qualities being inherited at corresponding ages, can modify the egg, seed or young, as easily as the adult. Among many animals sexual selection will have given its aid to ordinary selection by assuring to the most vigorous and best adapted males the greatest number of offspring. Sexual selection will also give characters useful to the males alone in their struggles or rivalry with other males; and these characters will be transmitted to one sex or to both sexes, according to the form of inheritance which prevails.

Whether natural selection has really thus acted in adapting the various forms of life to their several conditions and stations, must be judged by the general tenor and balance of evidence given in the following chapters. But we have already seen how it entails extinction; and how largely extinction has acted in the world's history, geology plainly declares. Natural selection, also, leads to divergence of character; for the more organic beings diverge in structure, habits and constitution, by so much the more can a large number be supported on the area, of which we see proof by looking to the inhabitants of any small spot, and to the productions naturalized in foreign lands. Therefore, during the modification of the descendants of any one species, and during the incessant struggle of all species to increase in numbers, the more diversified the descendants become, the better will be their chance of success in the battle for life. Thus the small differences distinguishing varieties of the same species, steadily tend to increase, till they equal the greater differences between species of the same genus or even of distinct genera.

We have seen that it is the common, the widely diffused, and widely ranging species, belonging to the larger genera within each class, which vary most; and these tend to transmit to their modified offspring that superiority which now makes them dominant in their own countries. Natural selection, which has just been remarked, leads to divergence of character and to much extinction of the less improved and intermediate forms of life. On these principles, the nature of the affinities, and the generally well defined distinctions between the innumerable organic beings in each class throughout the world, may be explained. It is a truly wonderful fact—the wonder of which we are apt to overlook from familiarity—that all animals and all plants, throughout all time and space, should be related to each other in groups, subordinate to groups, in the manner which we everywhere behold—namely, varieties of the same species most closely related, species of the same genus less closely and unequally related, forming sections and sub-genera, species of distinct genera much less closely related, and genera related in different degrees, forming sub-families, families, orders, sub-classes and classes. The several subordinate groups in any class cannot be ranked in a single file, but seem clustered round points, and these round other points, and so on in almost endless cycles. If species had been independently created, no explanation would have been possible of this kind of classification; but it is explained through inheritance and the complex action of natural selection, entailing extinction and divergence of character. . . .

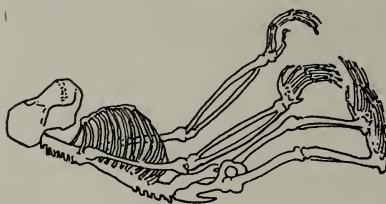
The affinities of all the beings of the same class have sometimes been represented by a great tree. I believe this simile largely speaks the truth. The green and budding twigs may represent existing species; and those produced during former years may represent the long succession of extinct species. At each period of growth all the growing twigs have tried to branch out on all sides, and to overtop and kill the surrounding twigs and branches, in the same manner as species and groups of species have at all times overmastered other species in the great battle for life. The limbs divided into great branches, and these into lesser and lesser branches, were themselves once, when the tree was young, budding twigs; and this connection of the former and present buds, by ramifying branches, may well represent the classification of all extinct and living species in groups subordinate to groups. Of the many twigs which flourished when the tree was a mere bush, only two or three, now grown into great branches, yet survive and bear the other branches; so with the species which lived during long-past geological periods, very few have left living and modified descendants. From the first growth of the tree, many a limb and branch has decayed and dropped off; and these fallen branches of various sizes may represent those whole orders, families and genera which have now no living representatives, and which are known to us only in a fossil state. As we here and there see a thin, straggling branch springing from a fork low down in a tree, and which by some chance has been favored and is still alive on its summit, so we occasionally see an animal like the *Ornithorhynchus* or *Lepidosiren*, which in some small degree connects by its affinities two large branches of life, and which has apparently been saved from fatal competition by having inhabited a protected station. As buds give rise by growth to fresh buds, and these, if vigorous, branch out and overtop on all sides many a feeble branch, so by generation I believe it has been with the great Tree of Life, which fills with its dead and broken branches the crust of the earth, and covers the surface with its ever-branching and beautiful ramifications.



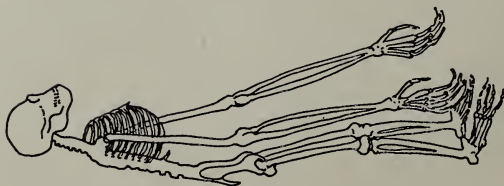
MAN



GORILLA

SKELETONS OF THE
CHIMPANZEE

ORANG



GIBBON

6. ON THE RELATIONS OF MAN TO THE LOWER ANIMALS¹

By THOMAS H. HUXLEY

The question of questions for mankind—the problem which underlies all others, and is more deeply interesting than any other—is the ascertainment of the place which man occupies in nature and of his relations to the universe of things. Whence our race has come; what are the limits of our power over nature, and of nature's power over us; to what goal we are tending; are the problems which present themselves anew and with undiminished interest to every man born into the world. Most of us, shrinking from the difficulties and dangers which beset the seeker after original answers to these riddles, are content to ignore them altogether, or to smother the investigating spirit under the feather-bed of respected and respectable tradition. But, in every age, one or two restless spirits, blessed with that constructive genius, which can only build on a secure foundation, or cursed with the spirit of mere scepticism, are unable to follow in the well-worn and comfortable track of their forefathers and contemporaries, and unmindful of thorns and stumbling-blocks, strike out into paths of their own. The sceptics end in the infidelity which asserts that the problem to be insoluble, or in the atheism which denies the existence of any orderly progress and governance of things: the men of genius propound solutions which grow into systems of Theology or of Philosophy, or veiled in musical language which suggests more than it asserts, take the shape of the Poetry of an epoch . . .

The facts to which I would first direct the reader's attention, though ignored by many of the professed instructors of the public mind, are easy of demonstration and are universally agreed to by men of science; while their significance is so great, that whoso has duly pondered over them will, I think, find little to startle him in the other revelations of Biology. I refer to those facts which have been made known by the study of Development.

It is a truth of very wide, if not of universal, application, that every living creature commences its existence under a form different from, and simpler than, that which it eventually attains.

The oak is a more complex thing than the little rudimentary plant contained in the acorn; the caterpillar is more complex than the egg; the butterfly than the caterpillar; and each of these beings, in passing from its rudimentary to its perfect condition, runs through a series of changes, the sum of which is

¹From Thomas H. Huxley, *Man's Place in Nature and Other Anthropological Essays*, second essay; "On the Relations of Man to the Lower Animals." Published 1863.

called its Development. In the higher animals these changes are extremely complicated; but, within the last half century, the labours of such men as Von Baer, Rathke, Reichert, Bischoff, and Remak, have almost completely unravelled them, so that the successive stages of development which are exhibited by a Dog, for example, are now as well known to the embryologist as are the steps of the metamorphosis of the silk worm moth to the school-boy. It will be useful to consider with attention the nature and the order of the stages of canine development, as an example of the process in the higher animals generally.

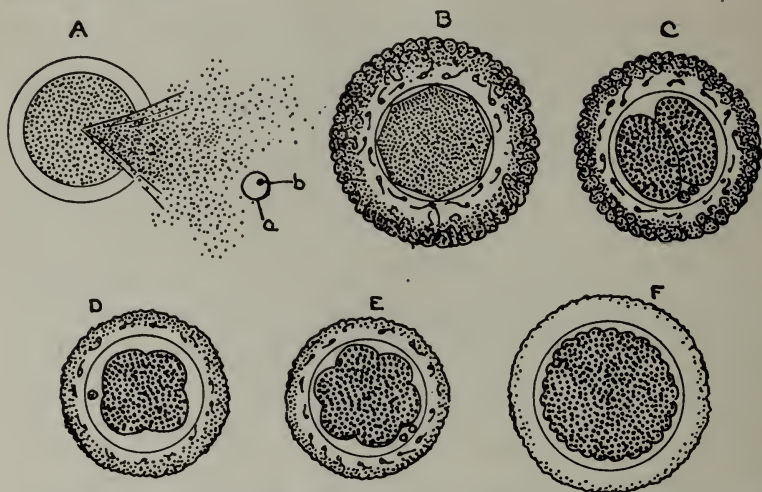


Fig. 13. A. Egg of the Dog, with the vitelline membrane burst, so as to give exit to the yolk, the germinal vesicle (*a*), and its included spot (*b*). B. C. D. E. F. Successive changes of the yolk indicated in the text. After Bischoff.

The dog, like all animals, save the very lowest (and further inquiries may not improbably remove the apparent exception), commences its existence as an egg: as a body which is, in every sense, as much an egg as that of a hen, but is devoid of that accumulation of nutritive matter which confers upon the bird's egg its exceptional size and domestic utility; and wants the shell, which would not only be useless to an animal incubated within the body of its parent, but would cut it off from access to the source of that nutriment which the young creature requires, but which the minute egg of the mammal does not contain within itself.

The Dog's egg is, in fact, a little spheroidal bag (Fig. 13), formed of a delicate transparent membrane called the *vitelline membrane*, and about 1-130 to 1-120 of an inch in diameter. It contains a mass of viscid nutritive matter

—the *yelk*—within which is enclosed a second much more delicate spheriodal bag, called the *germinal vesicle* (a). In this, lastly, lies a more solid rounded body, termed the *germinal spot* (b).

The egg, or *Ovum*, is originally formed within a gland, from which, in due season, it becomes detached, and passes into the living chamber fitted for its protection and maintenance during the protracted process of gestation. Here, when subjected to the required conditions, this minute and apparently insignificant particle of living matter becomes animated by a new and mysterious activity. The germinal vesicle and spot cease to be discernible (their precise fate being one of the yet unsolved problems of embryology), but the yelk becomes circumferentially indented, as if an invisible knife had been drawn round it, and thus appears divided into two hemispheres (Fig. 13, C).

By the repetition of this process in various planes, these hemispheres become subdivided, so that four segments are produced (D); and these, in like manner, divide and subdivide again, until the whole yelk is converted into a mass of granules, each of which consists of a minute spheriod of yelk-substance, inclosing a central particle, the so-called *nucleus* (F). Nature, by this process, has attained much the same result as that which a human artificer arrives at by his operations in a brick-field. She takes the rough plastic material of the yelk and breaks it up into well-shaped tolerably even-sized masses—handy for building up into any part of the living edifice.

Next, the mass of organic bricks, or *cells* as they are technically called, thus formed, acquires an orderly arrangement, becoming converted into a hollow spheroid with double walls. Then, upon one side of this spheroid, appears a thickening, and, by and bye, in the centre of the area of thickening, a straight shallow groove (Fig. 14, A) marks the central line of the edifice which is to be raised, or, in other other words, indicates the position of the middle line of the body of the future dog. The substance bounding the groove on each side next rises up into a fold, the rudiment of the side wall of that long cavity, which will eventually lodge the spinal marrow and the brain; and in the floor of this chamber appears a solid cellular cord, the so-called *notochord*. One end of the enclosed cavity dilates to form the head (Fig. 14, B), the other remains narrow, and eventually becomes the tail; the side walls of the body are fashioned out of the downward continuation of the walls of the groove; and from them, by and bye, grow out little buds which, by degrees, assume the shape of limbs. Watching the fashioning process stage by stage, one is forcibly reminded of the modeller in clay. Every part, every organ, is at first, as it were, pinched up rudely, and sketched out in the rough; then shaped more accurately; and only, at last, receives the touches which stamp its final character.

Thus, at length, the young puppy assumes such a form as is shown in Fig. 14, C. In this condition it has a disproportionately large head, as dissimilar to that of a dog as the budlike limbs are unlike his legs.

The remains of the yolk, which have not yet been applied to the nutrition and growth of the young animal, are contained in a sac attached to the rudimentary intestine, and termed the yolk sac, or *umbilical vesicle*. Two membranous bags, intended to subserve respectively the protection and nutrition of the young creature, have been developed from the skin and from the under and hinder surface of the body; the former, the so-called *amnion*, is a sac filled with fluid, which invests the whole body of the embryo, and plays the part of a sort of water-bed for it; the other, termed the *allantois*, grows out, loaded with blood-vessels, from the ventral region, and eventually applying itself to the walls of the cavity, in which the developing organism is contained, enables these vessels to become the channel by which the stream of nutriment, required to supply the wants of the offspring, is furnished to it by the parent.

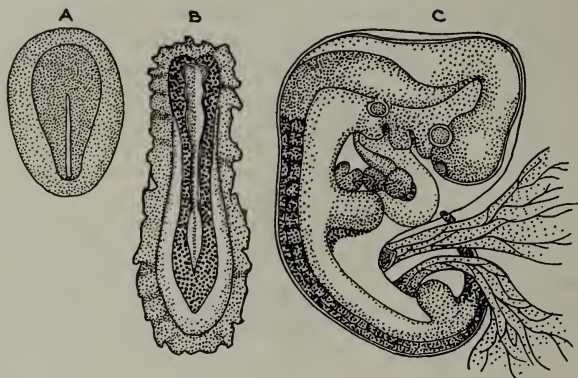


Fig. 14. A. Earliest rudiment of the Dog. B. Rudiment further advanced, showing the foundations of the head, tail, and vertebral column. C. The very young puppy, with attached ends of the yolk-sac and allantois, and invested in the amnion.

The structure which is developed by the interlacement of the vessels of the offspring with those of the parent, and by means of which the former is enabled to receive nourishment and to get rid of effete matters, is termed the *Placenta*.

It would be tedious, and it is unnecessary for my present purpose, to trace the process of development further; suffice it to say, that, by a long and gradual series of changes, the rudiment here depicted and described, becomes a puppy, and then, by still slower and less perceptible steps, passes into the adult Dog.

There is not much apparent resemblance between a barn-door Fowl and the Dog who protects the farm-yard. Nevertheless the student of development finds, not only that the chick commences its existence as an egg, primarily

identical, in all essential respects, with that of the Dog, but that the yelk of this egg undergoes division—that the primitive groove arises, and that the contiguous parts of the germ are fashioned, by precisely similar methods, into a young chick, which, at one stage of its existence, is so like the nascent Dog, that ordinary inspection would hardly distinguish the two.

The history of the development of any other vertebrate animal, Lizard, Snake, Frog, or Fish, tells the same story. There is always, to begin with, an egg having the same essential structure as that of the Dog:—the yelk of that egg always undergoes division, or *segmentation* as it is often called: the ultimate products of that segmentation constitute the building materials for the body of the young animal; and this is built up round a primitive groove, in the floor of which a notochord is developed. Furthermore, there is a period in which the young of all these animals resemble one another, not merely in outward form, but in all essentials of structure, so closely, that the differences between them are inconsiderable, while, in their subsequent course they diverge more and more widely from one another. And it is a general law, that, the more closely any animals resemble one another in adult structure, the longer and the more intimately do their embryos resemble one another: so that, for example, the embryos of a Snake and of a Lizard remain like one another longer than do those of a Snake and of a Bird; and the embryo of a Dog and of a Cat remain like one another for a far longer period than do those of a Dog and a Bird; or of a Dog and Opossum; or even than those of a Dog and a Monkey.

Thus the study of development affords a clear test of closeness of structural affinity, and one turns with impatience to inquire what results are yielded by the study of the development of Man. Is he something apart? Does he originate in a totally different way from Dog, Bird, Frog, and Fish, thus justifying those who assert him to have no place in nature and no real affinity with the lower world of animal life? Or does he originate in a similar germ, pass through the same slow and gradually progressive modifications, depend on the same contrivances for protection and nutrition, and finally enter the world by the help of the same mechanism? The reply is not doubtful for a moment, and has not been doubtful any time these thirty years. Without question, the mode of origin and the early stages of the development of man are identical with those of the animals immediately below him in the scale:—without a doubt, in these respects, he is far nearer the Apes, than the Apes are to the Dog.

The Human ovum is about 1-125 of an inch in diameter, and might be described in the same terms as that of the Dog, so that I need only refer to the figure illustrative (15, A) of its structure. It leaves the organ in which it is formed in a similar fashion and enters the organic chamber prepared for its reception in the same way, the conditions of its development being in all respects the same. It has not yet been possible (and only by some rare chance can it ever be possible) to study the human ovum in so early a developmental

stage as that of yelk division, but there is every reason to conclude that the changes it undergoes are identical with those exhibited by the ova of other vertebrated animals; for the formative materials of which the rudimentary human body is composed, in the earliest conditions in which it has been observed, are the same as those of other animals. Some of these earliest stages are figured above and, as will be seen, they are strictly comparable to the very early states of the Dog; the marvellous correspondence between the two which is kept up, even for some time, as development advances, becoming apparent by the simple comparison of the figures with those in figure 14.

Indeed, it is very long before the body of the young human being can be readily discriminated from that of the young puppy; but, at a tolerably early period, the two become distinguishable by the different form of their adjuncts,

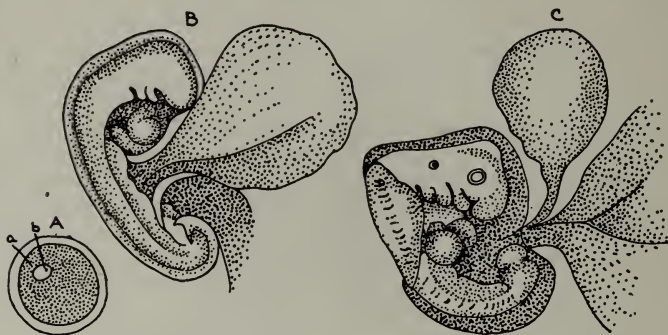


Fig. 15. A. Human ovum (after Kölliker). *a.* germinal vesicle. *b.* germinal spot. B. A very early condition of Man, with yelk-sac, allantois and amnion (original). C. A more advanced stage (after Kölliker), compare Fig. 14, C.

the yelk-sac and the allantois. The former, in the Dog, becomes long and spindle-shaped, while in Man it remains spherical: the latter, in the Dog, attains an extremely large size, and the vascular processes which are developed from it and eventually give rise to the formation of the placenta (taking root, as it were, in the parental organism, so as to draw nourishment therefrom, as the root of a tree extracts it from the soil) are arranged in an encircling zone, while in Man, the allantois remains comparatively small, and its vascular rootlets are eventually restricted to one disk-like spot. Hence, while the placenta of the Dog is like a girdle, that of Man has the cake-like form, indicated by the name of the organ.

But, exactly in those respects in which the developing Man differs from the Dog, he resembles the ape, which, like man, has a spheroidal yelk-sac and a discoidal, sometimes partially lobed, placenta. So that it is only quite in the later stages of development that the young human being presents

marked differences from the young ape, while the latter departs as much from the dog in its development, as the man does.

Startling as the last assertion may appear to be, it is demonstrably true, and it alone appears to me sufficient to place beyond all doubt the structural unity of man with the rest of the animal world, and more particularly and closely with the apes.

Thus, identical in the physical processes by which he originates—identical in the early stages of his formation—identical in the mode of his nutrition before and after birth, with the animals which lie immediately below him in the scale—Man, if his adult and perfect structure be compared with theirs, exhibits, as might be expected, a marvellous likeness of organization. He resembles them as they resemble each other—he differs from them as they differ from one another.—And, though these differences and resemblances cannot be weighed and measured, their value may be readily estimated; the scale or standard of judgment, touching that value being afforded and expressed by the system of classification of animals now current among zoologists.

A careful study of the resemblances and differences presented by animals has, in fact, led naturalists to arrange them into groups, or assemblages, all the members of each group presenting a certain amount of definable resemblance, and the number of points of similarity being smaller as the group is larger and *vice versâ*. Thus, all creatures which agree only in presenting the few distinctive marks of animality form the *Kingdom* ANIMALIA. The numerous animals which agree only in possessing the special characters of Vertebrates form one *Sub-kingdom* of this Kingdom. Then the Sub-kingdom VERTEBRATA is subdivided into the five *Classes*, Fishes, Amphibians, Reptiles, Birds, and Mammals, and these into smaller groups called *Orders*; these into *Families* and *Genera*; while the last are finally broken up into the smallest assemblages, which are distinguished by the possession of constant, not-sexual, characters. These ultimate groups are *Species*.

Every year tends to bring about a greater uniformity of opinion throughout the zoological world as to the limits and characters of these groups, great and small. At present, for example, no one has the least doubt regarding the characters of the classes Mammalia, Aves, or Reptilia; nor does the question arise whether any thoroughly well-known animal should be placed in one class or the other. Again, there is a very general agreement respecting the characters and limits of the orders of Mammals, and as to the animals which are structurally necessitated to take a place in one or another order.

No one doubts, for example, that the Sloth and the Anteater, the Kangaroo and the Opossum, the Tiger and the Badger, the Tapir and the Rhinoceros, are respectively members of the same orders. These successive pairs of animals may, and some do, differ from one another immensely, in such matters as the proportions and structure of their limbs; the number of their dorsal and lumbar vertebræ; the adaptation of their frames to climbing, leaping, or running; the number and form of their teeth; and the characters

of their skulls and of the contained brain. But, with all these differences, they are so closely connected in all the more important and fundamental characters of their organization, and so distinctly separated by these same characters from other animals, that zoologists find it necessary to group them together as members of one order. And if any new animal were discovered, and were found to present no greater difference from the Kangaroo or from the Opossum, for example, than these animals do from one another, the zoologist would not only be logically compelled to rank it in the same order with these, but he would not think of doing otherwise.

Bearing this obvious course of zoological reasoning in mind, let us endeavour for a moment to disconnect our thinking selves from the mask of humanity; let us imagine ourselves scientific Saturnians, if you will, fairly acquainted with such animals as now inhabit the Earth, and employed in discussing the relations they bear to a new and singular "erect and featherless biped," which some enterprising traveller, overcoming the difficulties of space and gravitation, has brought from that distant planet for our inspection, well preserved, may be, in a cask of rum. We should all, at once, agree upon placing him among the mammalian vertebrates; and his lower jaw, his molars, and his brain, would leave no room for doubting the systematic position of the new genus among those mammals, whose young are nourished during gestation by means of a placenta, or what is called the "placental mammals."

Further, the most superficial study would at once convince us that, among the orders of placental mammals, neither the Whales, nor the hoofed creatures, nor the Sloths and Anteaters, nor the carnivorous Cats, Dogs, and Bears, still less the Rodent Rats and Rabbits, or the Insectivorous Moles and Hedgehogs, or the Bats, could claim our *Homo*, as one of themselves.

There would remain then but one order for comparison, that of the Apes (using the word in its broadest sense), and the question for discussion would narrow itself to this—is Man so different from any of these Apes that he must form an order by himself? Or does he differ less from them than they differ from one another, and hence must take his place in the same order with them?

Being happily free from all real, or imaginary, personal interest in the results of the inquiry thus set afoot, we should proceed to weigh the arguments on one side and on the other, with as much judicial calmness as if the question related to a new Opossum. We should endeavour to ascertain, without seeking either to magnify or diminish them, all the characters by which our new Mammal differed from the Apes; and if we found that these were of less structural value than those which distinguish certain members of the Ape order from others universally admitted to be of the same order, we should undoubtedly place the newly discovered tellurian genus with them.

I now proceed to detail the facts which seem to me to leave no choice but to adopt the last-mentioned course.

It is quite certain that the Ape which most nearly approaches man, in the totality of its organisation, is either the Chimpanzee or the Gorilla; and as it makes no practical difference, for the purposes of my present argument, which is selected for comparison, on the one hand, with Man, and on the other hand, with the rest of the Primates, I shall select the latter (so far as its organisation is known)—as a brute now so celebrated in prose and verse, that all must have heard of him, and have formed some conception of his appearance. I shall take up as many of the most important points of difference between man and this remarkable creature, as the space at my disposal will allow me to discuss, and the necessities of the argument demand; and I shall inquire into the value and magnitude of these differences, when placed side by side with those which separate the Gorilla from other animals of the same order.

In the general proportions of the body and limbs there is a remarkable difference between the Gorilla and Man, which at once strikes the eye. The Gorilla's brain-case is smaller, its trunk larger, its lower limbs shorter, its upper limbs longer in proportion than those of Man.

I find that the vertebral column of a full-grown Gorilla, in the Museum of the Royal College of Surgeons, measures 27 inches along its anterior curvature, from the upper edge of the atlas, or first vertebra of the neck, to the lower extremity of the sacrum; that the arm, without the hand, is $31\frac{1}{2}$ inches long; that the leg, without the foot, is $26\frac{1}{2}$ inches long; that the hand is $9\frac{3}{4}$ inches long; the foot $11\frac{1}{4}$ inches long.

In other words, taking the length of the spinal column as 100, the arm equals 115, the leg 96, the hands 36, and the foot 41.

In the skeleton of a male Bosjesman, in the same collection, the proportions, by the same measurement, to the spinal column, taken as 100, are—the arm 78, the leg 110, the hand 26, and the foot 32. In a woman of the same race the arm is 83, and the leg 120, the hand and foot remaining the same. In a European skeleton I find the arm to be 80, the leg 117, the hand 26, the foot 35.

Thus the leg is not so different as it looks at first sight, in its proportion to the spine in the Gorilla and in the Man—being very slightly shorter than the spine in the former, and between 1-10 and 1-5 longer than the spine in the latter. The foot is longer and the hand much longer in the Gorilla; but the great difference is caused by the arms, which are very much longer than the spine in the Gorilla, very much shorter than the spine in the Man.

The question now arises how are the other Apes related to the Gorilla in these respects—taking the length of the spine, measured in the same way, at 100. In an adult Chimpanzee, the arm is only 96, the leg 90, the hand 43, the foot 39—so that the hand and the leg depart more than the human proportion and the arm less, while the foot is about the same as in the Gorilla.

In the Orang, the arms are very much longer than in the Gorilla (122), while the legs are shorter (88); the foot is longer than the hand (52 and 48), and both are much longer in proportion to the spine.

In the other man-like Apes again, the Gibbons, these proportions are still further altered; the length of the arms being to that of the spinal column as 19 to 11; while the legs are also a third longer than the spinal column, so as to be longer than in Man, instead of shorter. The hand is half as long as the spinal column, and the foot, shorter than the hand, is about 5-11 of the length of the spinal column.

Thus *Hylobates* is as much longer in the arms than the Gorilla, as the Gorilla is longer in the arms than Man; while, on the other hand, it is as much longer in the legs than the Man, as the Man is longer in the legs than the Gorilla, so that it contains within itself the extremest deviations from the average length of both pairs of limbs. . . .

These examples might be greatly multiplied, but they suffice to show that, in whatever proportion of its limbs the Gorilla differs from Man, the other Apes depart still more widely from the Gorilla and that, consequently, such differences of proportion can have no ordinal value.

We may next consider the differences presented by the trunk, consisting of the vertebral column, or backbone, and the ribs and pelvis, or bony hip-basin, which are connected with it, in Man and in the Gorilla respectively.

In Man, in consequence partly of the disposition of the articular surfaces of the vertebræ, and largely of the elastic tension of some of the fibrous bands, or ligaments, which connect these vertebræ together, the spinal column, as a whole, has an elegant S-like curvature, being convex forwards in the neck, concave in the back, convex in the loins, or lumbar region, and concave again in the sacral region; an arrangement which gives much elasticity to the whole backbone, and diminishes the jar communicated to the spine, and through it to the head, by locomotion in the erect position. . . .

The vertebral column of the Gorilla, as a whole, differs from that of Man in the less marked character of its curves, especially in the slighter convexity of the lumbar region. Nevertheless, the curves are present, and are quite obvious in young skeletons of the Gorilla and Chimpanzee which have been prepared without removal of the ligaments. In young Orangs similarly preserved, on the other hand, the spinal column is either straight, or even concave forwards, throughout the lumbar region.

Whether we take these characters then, or such minor ones as those which are derivable from the proportional length of the spines of the cervical vertebræ, and the like, there is no doubt whatsoever as to the marked difference between Man and the Gorilla; but there is as little, that equally marked differences, of the very same order, obtain between the Gorilla and the lower Apes. . . .

But now let us turn to a nobler and more characteristic organ—that by which the human frame seems to be, and indeed is, so strongly distinguished from all others,—I mean the skull. The differences between a Gorilla's skull and a Man's are truly immense (Fig. 17). In the former, the face, formed largely by the massive jaw-bones, predominates over the brain-case, or cranium proper: in the latter, the proportions of the two are reversed. In the Man, the occipital foramen, through which passes the great nervous cord connecting the brain with the nerves of the body, is placed just behind the centre of the base of the skull, which thus becomes evenly balanced in the erect posture; in the Gorilla, it lies in the posterior third of that base. In the Man, the surface of the skull is comparatively smooth, and the supraciliary ridges or brow prominences usually project but little—while, in the Gorilla, vast crests are developed upon the skull, and the brow ridges overhang the cavernous orbits, like great penthouses.

Sections of the skulls, however, show that some of the apparent defects of the Gorilla's cranium arise, in fact, not so much from deficiency of brain-case as from excessive development of the parts of the face. The cranial cavity is not ill-shaped, and the forehead is not truly flattened or very retreating, its really well-formed curve being simply disguised by the mass of bone which is built up against it (Fig. 17).

But the roofs of the orbits rise more obliquely into the cranial cavity, thus diminishing the space for the lower part of the anterior lobes of the brain, and the absolute capacity of the cranium is far less than that of Man. So far as I am aware, no human cranium belonging to an adult man has yet been observed with a less cubical capacity than 62 cubic inches, the smallest cranium observed in any race of men by Morton, measuring 63 cubic inches; while, on the other hand, the most capacious Gorilla skull yet measured has a content of not more than $34\frac{1}{2}$ cubic inches. Let us assume, for simplicity's sake, that the lowest Man's skull has twice the capacity of that of the highest Gorilla.

No doubt, this is a very striking difference, but it loses much of its apparent systematic value, when viewed by the light of certain other equally indubitable facts respecting cranial capacities.

The first of these is, that the difference in the volume of the cranial cavity of different races of mankind is far greater, absolutely, than that between the lowest Man and the highest Ape, while, relatively, it is about the same. For the largest human skull measured by Morton contained 114 cubic inches, that is to say, had very nearly double the capacity of the smallest; while its absolute preponderance, of 52 cubic inches—is far greater than that by which the lowest adult male human cranium surpasses the largest of the Gorillas ($62-34\frac{1}{2}=27\frac{1}{2}$). Secondly, the adult crania of Gorillas which have as yet been measured differ among themselves by nearly one-third, the maximum capacity being 34.5 cubic inches, the minimum 24 cubic inches; and, thirdly, after making all due allowance for difference of size, the cranial capacities of

some of the lower Apes fall nearly as much, relatively, below those of the higher Apes as the latter fall below Man.

Thus, even in the important matter of cranial capacity, Men differ more widely from one another than they do from the Apes; while the lowest Apes

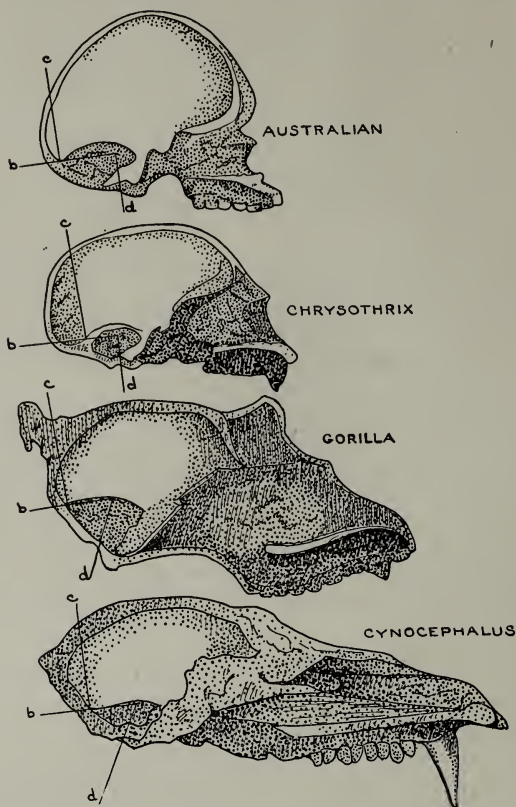


Fig. 17. Sections of the skulls of Man and various Apes.

differ as much, in proportion, from the highest, as the latter does from Man. The last proposition is still better illustrated by the study of the modifications which other parts of the cranium undergo in the Simian series.

It is the large proportional size of the facial bones and the great projection of the jaws which confer upon the Gorilla's skull its small facial angle and brutal character.

But if we consider the proportional size of the facial bones to the skull proper only, the little *Chrysothrix* (Fig. 17) differs very widely from the Gorilla, and, in the same way, as Man does; while the Baboons (*Cynocephalus*, Fig. 17) exaggerate the gross proportions of the muzzle of the great Anthropoid, so that its visage looks mild and human by comparison with theirs. The difference between the Gorilla and the Baboon is even greater than it appears at first sight; for the great facial mass of the former is largely due to a downward development of the jaws; an essentially human character, superadded upon that almost purely forward, essentially brutal, development of the same parts which characterises the Baboon, and yet more remarkably distinguishes the Lemur. . . .

What is true of these leading characteristics of the skull, holds good, as may be imagined, of all minor features; so that for every constant difference between the Gorilla's skull and the Man's a similar constant difference of the same order (that is to say, consisting in excess or defect of the same quality) may be found between the Gorilla's skull and that of some other ape. So that, for the skull, no less than for the skeleton in general, the proposition holds good, that the differences between Man and the Gorilla are of smaller value than those between the Gorilla and some other Apes.

In connection with the skull, I may speak of the teeth—organs which have a peculiar classificatory value, and whose resemblances and differences of number, form, and succession, taken as a whole, are usually regarded as more trustworthy indicators of affinity than any others.

Man is provided with two sets of teeth—milk teeth and permanent teeth. The former consist of four incisors, or cutting teeth; two canines, or eye-teeth; and four molars or grinders, in each jaw, making twenty in all. The latter (Fig. 18) comprise four incisors, two canines, four small grinders, called premolars or false molars, and six large grinders, or true molars in each jaw—making thirty-two in all. The internal incisors are larger than the external pair, in the upper jaw, smaller than the external pair, in the lower jaw. The crowns of the upper molars exhibit four cusps, or blunt-pointed elevations, and a ridge crosses the crown obliquely, from the inner, anterior cusp to the outer, posterior cusp. The anterior lower molars have five cusps, three external and two internal. The premolars have two cusps, one internal and one external, of which the outer is the higher.

In all these respects the dentition of the Gorilla may be described in the same terms as that of Man; but in other matters it exhibits many and important differences (Fig. 18).

Thus the teeth of man constitute a regular and even series—without any break and without any marked projection of one tooth above the level of the rest; a peculiarity which, as Cuvier long ago showed, is shared by no other mammal save one—as different a creature from man as can well be imagined—namely, the long extinct *Anoplotherium*. The teeth of the Gorilla, on the

contrary, exhibit a break, or interval, termed the *diastema*, in both jaws: in front of the eye-tooth, or between it and the outer incisor, in the upper jaw; behind the eye-tooth, or between it and the front false molar, in the lower jaw. Into this break in the series, in each jaw, fits the canine of the opposite jaw; the size of the eye-tooth in the Gorilla being so great that it projects, like a tusk, far beyond the general level of the other teeth. The roots of the false molar teeth of the Gorilla, again, are more complex than in Man, and the pro-

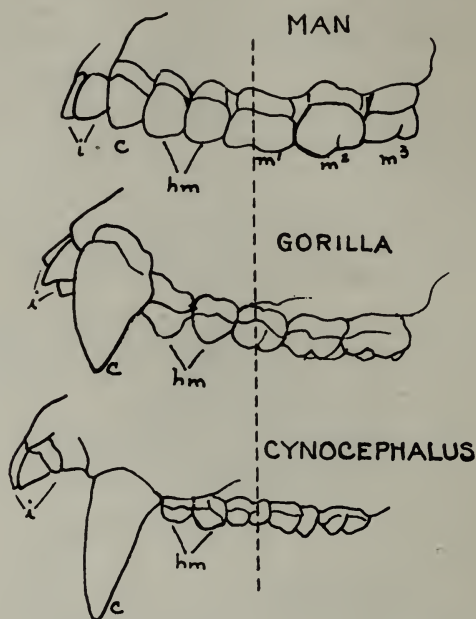


Fig. 18. Lateral views, of the same length, of the upper jaws of various Primates. *i*, incisors; *c*, canines; *pm*, premolars; *m*, molars.

portional size of the molars is different. The Gorilla has the crown of the hindmost grinder of the lower jaw more complex, and the order of eruption of the permanent teeth is different; the permanent canines making their appearance before the second and third molars in Man, and after them in the Gorilla.

Thus, while the teeth of the Gorilla closely resemble those of Man in number, kind, and in the general pattern of their crowns, they exhibit marked differences from those of Man in secondary respects, such as relative size, number of fangs, and order of appearance.

But, if the teeth of the Gorilla be compared with those of an Ape, no further removed from it than a *Cynocephalus*, or Baboon, it will be found that differences and resemblances of the same order are easily observable; but that many of the points in which the Gorilla resembles Man are those in which it differs from Man are exaggerated in the *Cynocephalus*. The number and the nature of the teeth remain the same in the Baboon as in the Gorilla and in Man. But the pattern of the Baboon's upper molars is quite different from that described above (Fig. 18), the canines are proportionally longer and more knife-like; the anterior premolar in the lower jaw is specially modified; the posterior molar of the lower jaw is still larger and more complex than in the Gorilla. . . .

Hence it is obvious that, greatly as the dentition of the highest Ape differs from that of Man, it differs far more widely from that of the lower and lowest Apes. . . .

Before entering upon the precise question of the amount of difference between the Ape's brain and that of Man, it is necessary that we should clearly understand what constitutes a great, and what a small difference in cerebral structure; and we shall be best enabled to do this by a brief study of the chief modifications which the brain exhibits in the series of vertebrate animals.

The brain of a fish is very small, compared with the spinal cord into which it is continued, and with the nerves which come off from it: of the segments of which it is composed—the olfactory lobes, the cerebral hemispheres, and the succeeding divisions—no one predominates so much over the rest as to obscure or cover them; and the so-called optic lobes are, frequently, the largest masses of all. In Reptiles, the mass of the brain, relatively to the spinal cord, increases and the cerebral hemispheres begin to predominate over the other parts; while in Birds this predominance is still more marked. The brain of the lowest Mammals, such as the duck-billed Platypus and the Opossums and Kangaroos, exhibits a still more definite advance in the same direction. The cerebral hemispheres have now so much increased in size as, more or less, to hide the representatives of the optic lobes, which remain comparatively small, so that the brain of a Marsupial is extremely different from that of a Bird, Reptile, or Fish. A step higher in the scale, among the placental Mammals, the structure of the brain acquires a vast modification—not that it appears much altered externally, in a Rat or in a Rabbit, from what it is in a Marsupial—nor that the proportions of its parts are much changed, but an apparently new structure is found between the cerebral hemispheres, connecting them together, at what is called the “great commissure” or “corpus callosum.” The subject requires careful re-investigation, but if the currently received statements are correct, the appearance of the “corpus callosum” in the placental mammals is the greatest and most sudden modification exhibited by the brain in the whole series of vertebrated animals—it is the greatest leap anywhere made by Nature in her brain work. For the two halves of

the brain being once thus knit together, the progress of cerebral complexity is traceable through a complete series of steps from the lowest Rodent, or Insectivore, to Man; and that complexity consists, chiefly, in the disproportionate development of the cerebral hemispheres and of the cerebellum, but especially of the former, in respect to the other parts of the brain.

In the lower placental mammals, the cerebral hemispheres leave the proper upper and posterior face of the cerebellum completely visible, when the brain is viewed from above; but, in the higher forms, the hinder part of each hemisphere, separated only by the tentorium from the anterior face of the cerebellum, inclines backwards and downwards, and grows out, as the so-called "posterior lobe," so as at length to overlap and hide the cerebellum. In all Mammals, each cerebral hemisphere contains a cavity which is termed the "ventricle;" and, as this ventricle is prolonged, on the one hand, forwards, and on the other downwards, into the substance of the hemisphere, it is said to have two horns or "cornua," an "anterior cornu," and a "descending cornu." When the posterior lobe is well developed, a third prolongation of the ventricular cavity extends into it, and is called the "posterior cornu."

In the lower and smaller forms of placental Mammals the surface of the cerebral hemispheres is either smooth or evenly rounded, or exhibits a very few grooves, which are technically termed "sulci," separating ridges or "convolutions" of the substance of the brain; and the smaller species of all orders tend to a similar smoothness of brain. But, in the higher orders, and especially the larger members of these orders, the grooves, or sulci, become extremely numerous, and the intermediate convolutions proportionately more complicated in their meanderings, until, in the Elephant, the Porpoise, the higher Apes, and Man, the cerebral surface appears a perfect labyrinth of tortuous foldings.

Where a posterior lobe exists and presents its customary cavity—the posterior cornu—it commonly happens that a particular sulcus appears upon the inner and under surface of the lobe, parallel with and beneath the floor of the cornu—which is, as it were, arched over the roof of the sulcus. It is as if the groove had been formed by indenting the floor of the posterior horn from without with a blunt instrument, so that the floor should rise as a convex eminence. Now this eminence is what has been termed the "Hippocampus minor;" the "Hippocampus major" being a larger eminence in the floor of the descending cornu. What may be the functional importance of either of these structures we know not.

As if to demonstrate, by a striking example, the impossibility of erecting any cerebral barrier between man and the apes, Nature has provided us, in the latter animals, with an almost complete series of gradations from brains little higher than that of a Rodent, to brains little lower than that of Man. And it is a remarkable circumstance, that though so far as our present knowledge extends, there is one true structural break in the series of forms of Simian brains, this hiatus does not lie between Man and the man-like apes, but be-

tween the lower and the lowest Simians; or, in other words, between the old and new world apes and monkeys, and the Lemurs. Every Lemur which has yet been examined, in fact, has its cerebellum partially visible from above, and its posterior lobe, with the contained posterior cornu and hippocampus minor, more or less rudimentary. Every Marmoset, American monkey, old world monkey, Baboon or Man-like ape, on the contrary, has its cerebellum entirely hidden, posteriorly, by the cerebral lobes, and possesses a large posterior cornu, with a well-developed hippocampus minor.

In many of these creatures, such as the Saimiri (*Chrysotrrix*), the cerebral lobes overlap and extend much further behind the cerebellum, in proportion, than they do in man (Fig. 17)—and it is quite certain that, in all, the cerebellum is completely covered behind, by well developed posterior lobes. The fact can be verified by every one who possesses the skull of any old or new world monkey. For, inasmuch as the brain in all mammals completely fills the cranial cavity, it is obvious that a cast of the interior of the skull will reproduce the general form of the brain, at any rate with such minute and, for the present purpose, utterly unimportant differences as may result from the absence of the enveloping membranes of the brain in the dry skull. But if such a cast be made in plaster, and compared with a similar cast of the interior of a human skull, it will be obvious that the cast of the cerebral chamber, representing the cerebrum of the ape, as completely covers over and overlaps the cast of the cerebellar chamber, representing the cerebellum, as it does in the man. A careless observer, forgetting that a soft structure like the brain loses its proper shape the moment it is taken out of the skull, may indeed mistake the uncovered condition of the cerebellum of an extracted and distorted brain for the natural relations of the parts; but his error must become patent even to himself if he try to replace the brain within the cranial chamber. To suppose that the cerebellum of an ape is naturally uncovered behind is a misconception comparable only to that of one who should imagine that a man's lungs always occupy but a small portion of the thoracic cavity, because they do so when the chest is opened, and their elasticity is no longer neutralized by the pressure of the air.

And the error is the less excusable, as it must become apparent to every one who examines a section of the skull of any ape above a Lemur, without taking the trouble to make a cast of it. For there is a very marked groove in every such skull; as in the human skull—which indicates the line of attachment of what is termed the *tentorium*—a sort of parchment-like shelf, or partition, which, in the recent state, is interposed between the cerebrum and cerebellum, and prevents the former from pressing upon the latter.

This groove, therefore, indicates the line of separation between that part of the cranial cavity which contains the cerebrum, and that which contains the cerebellum; and as the brain exactly fills the cavity of the skull, it is obvious that the relations of these two parts of the cranial cavity at once informs us of the relations of their contents. Now in man, in all the old world, and in

all the new world Simiæ, with one exception, when the face is directed forwards, this line of attachment of the tentorium, or impression for the lateral sinus, as it is technically called, is nearly horizontal, and the cerebral chamber invariably overlaps or projects behind the cerebellar chamber. In the Howler Monkey or *Myctes*, the line passes obliquely upwards and backwards, and the cerebral overlap is almost nil; while in the Lemurs, as in the lower mammals, the line is much more inclined in the same direction, and the cerebellar chamber projects considerably beyond the cerebral.

When the gravest errors respecting points so easily settled as this question respecting the posterior lobes, can be authoritatively propounded, it is no wonder that matters of observation, of no very complex character, but still requiring a certain amount of care, should have fared worse. Any one who cannot see the posterior lobe in an ape's brain is not likely to give a very valuable opinion respecting the posterior cornu or the hippocampus minor. If a man cannot see a church, it is preposterous to take his opinion about its altar-piece or painted window—so that I do not feel bound to enter upon any discussion of these points, but content myself with assuring the reader that the posterior cornu and the hippocampus minor, have now been seen—usually, at least as well developed as in man, and often better—not only in the Chimpanzee, the Orang, and the Gibbon, but in all the genera of the old world baboons and monkeys, and in most of the new world forms, including the Marmosets.

In fact, all the abundant and trustworthy evidence (consisting of the results of careful investigations directed to the determination of these very questions, by skilled anatomists) which we now possess, leads to the conviction that, so far from the posterior lobe, the posterior cornu, and the hippocampus minor, being structures peculiar to and characteristic of man, as they have been over and over again asserted to be, even after the publication of the clearest demonstration of the reverse, it is precisely these structures which are the most marked cerebral characters common to man with the apes. They are among the most distinctly Simian peculiarities which the human organism exhibits.

As to the convolutions, the brains of the apes exhibit every stage of progress, from the almost smooth brain of the Marmoset, to the Orang and the Chimpanzee, which fall but little below Man. And it is most remarkable that, as soon as all the principal sulci appear, the pattern according to which they are arranged is identical with that of the corresponding sulci of man. The surface of the brain of a monkey exhibits a sort of skeleton map of man's, and in the man-like apes the details become more and more filled in, until it is only in minor characters, such as the greater excavation of the anterior lobes, the constant presence of fissures usually absent in man, and the different disposition and proportions of some convolutions, that the Chimpanzee's or the Orang's brain can be structurally distinguished from Man's.

So far as cerebral structure goes, therefore, it is clear that Man differs less from the Chimpanzee or the Orang, than these do even from the Monkeys, and that the difference between the brains of the Chimpanzee and of Man is almost insignificant, when compared with that between the Chimpanzee brain and that of a Lemur.

It must not be overlooked, however, that there is a very striking difference in absolute mass and weight between the lowest human brain and that of the highest ape—a difference which is all the more remarkable when we recollect that a full-grown Gorilla is probably pretty nearly twice as heavy as a Bosjesman, or as many an European woman. It may be doubted whether a healthy human adult brain ever weighed less than thirty-one or two ounces, or that the heaviest Gorilla brain has exceeded twenty ounces.

This is a very noteworthy circumstance, and doubtless will one day help to furnish an explanation of the great gulf which intervenes between the lowest man and the highest ape in intellectual power; but it has little systematic value, for the simple reason that, as may be concluded from what has already been said respecting cranial capacity, the difference in weight of brain between the highest and the lowest men is far greater, both relatively and absolutely, than that between the lowest man and the highest ape. The latter, as has been seen, is represented by, say twelve, ounces of cerebral substance absolutely or by 32:20 relatively; but as the largest recorded human brain weighed between 65 and 66 ounces, the former difference is represented by more than 33 ounces absolutely, or by 65:32 relatively. Regarded systematically, the cerebral differences of man and apes, are not of more than generic value; his Family distinction resting chiefly on his dentition, his pelvis, and his lower limbs.

Thus, whatever system of organs be studied, the comparison of their modifications in the ape series leads to one and the same result—that the structural differences which separate Man from the Gorilla and the Chimpanzee are not so great as those which separate the Gorilla from the lower apes.

But in enunciating this important truth I must guard myself against a form of misunderstanding, which is very prevalent. I find, in fact, that those who endeavour to teach what nature so clearly shows us in this matter, are liable to have their opinions misrepresented and their phraseology garbled, until they seem to say that the structural differences between man and even the highest apes are small and insignificant. Let me take this opportunity then of distinctly asserting, on the contrary, that they are great and significant; that every bone of a Gorilla bears marks by which it might be distinguished from the corresponding bone of a Man; and that, in the present creation, at any rate, no intermediate link bridges over the gap between *Homo* and *Troglodytes*.

It would be no less wrong than absurd to deny the existence of this chasm; but it is at least equally wrong and absurd to exaggerate its magnitude and,

resting on the admitted fact of its existence, to refuse to inquire whether it is wide or narrow. Remember, if you will, that there is no existing link between Man and the Gorilla, but do not forget that there is a no less sharp line of demarcation, a no less complete absence of any transitional form, between the Gorilla and the Orang, or the Orang and the Gibbon. I say, not less sharp, though it is somewhat narrower. The structural differences between Man and the Man-like apes certainly justify our regarding him as constituting a family apart from them; though, inasmuch as he differs less from them than they do from other families of the same order, there can be no justification for placing him in a distinct order. . . .

These are the chief facts, this the immediate conclusion from them to which I adverted in the commencement of this Essay. The facts, I believe, cannot be disputed; and if so, the conclusion appears to me to be inevitable.

But if Man be separated by no greater structural barrier from the brutes than they are from one another—then it seems to follow that if any process of physical causation can be discovered by which the genera and families of ordinary animals have been produced, that process of causation is amply sufficient to account for the origin of Man. In other words, if it could be shown that the Marmosets, for example, have arisen by gradual modification of the ordinary Platyrrhini, or that both Marmosets and Platyrrhini are modified ramifications of a primitive stock—then, there would be no rational ground for doubting that man might have originated, in the one case, by the gradual modification of a man-like ape; or, in the other case, as a ramification of the same primitive stock as those apes.

At the present moment, but one such process of physical causation has any evidence in its favour; or, in other words, there is but one hypothesis regarding the origin of species of animals in general which has any scientific existence—that propounded by Mr. Darwin. For Lamarck, sagacious as many of his views were, mingled them with so much that was crude and even absurd, as to neutralize the benefit which his originality might have effected, had he been a more sober and cautious thinker; and though I have heard of the announcement of a formula touching “the ordained continuous becoming of organic forms,” it is obvious that it is the first duty of a hypothesis to be intelligible, and that a *qua-quâ-versal* proposition of this kind, which may be read backwards, or forwards, or sideways, with exactly the same amount of signification, does not really exist, though it may seem to do so.

At the present moment, therefore, the question of the relation of man to the lower animals resolves itself, in the end, into the larger question of the tenability, or untenability, of Mr. Darwin’s views. But here we enter upon difficult ground, and it behoves us to define our exact position with the greatest care.

It cannot be doubted, I think, that Mr. Darwin has satisfactorily proved that what he terms selection, or selective modification, must occur, and does

occur, in nature; and he has also proved to superfluity that such selection is competent to produce forms as distinct, structurally, as some genera even are. If the animated world presented us with none but structural differences, I should have no hesitation in saying that Mr. Darwin had demonstrated the existence of a true physical cause, amply competent to account for the origin of living species, and of man among the rest.

But, in addition to their structural distinction, the species of animals and plants, or at least a great number of them, exhibit physiological characters—what are known as distinct species, structurally, being for the most part either altogether incompetent to breed one with another; or if they breed, the resulting mule, or hybrid, is unable to perpetuate its race with another hybrid of the same kind.

A true physical cause is, however, admitted to be such only on one condition—that it shall account for all the phenomena which come within the range of its operation. If it is inconsistent with any one phenomenon, it must be rejected; if it fails to explain any one phenomenon, it is so far weak, so far to be suspected; though it may have a perfect right to claim provisional acceptance.

Now, Mr. Darwin's hypothesis is not, so far as I am aware, inconsistent with any known biological fact; on the contrary, if admitted, the facts of Development, of Comparative Anatomy, of Geographical Distribution, and of Palæontology, become connected together, and exhibit a meaning such as they never possessed before; and I, for one, am fully convinced, that if not precisely true, that hypothesis is as near an approximation to the truth as, for example, the Copernican hypothesis was to the true theory of the planetary motions.

But, for all this, our acceptance of the Darwinian hypothesis must be provisional so long as one link in the chain of evidence is wanting; and so long as all the animals and plants certainly produced by selective breeding from a common stock are fertile, and their progeny are fertile with one another, that link will be wanting. For, so long, selective breeding will not be proved to be competent to do all that is required of it to produce natural species.

I have put this conclusion as strongly as possible before the reader, because the last position in which I wish to find myself is that of an advocate for Mr. Darwin's, or any other views; if by an advocate is meant one whose business it is to smooth over real difficulties, and to persuade where he cannot convince.

In justice to Mr. Darwin, however, it must be admitted that the conditions of fertility and sterility are very ill understood, and that every day's advance in knowledge leads us to regard the hiatus in his evidence as of less and less importance, when set against the multitude of facts which harmonize with, or receive an explanation from, his doctrines.

I adopt Mr. Darwin's hypothesis, therefore, subject to the production of proof that physiological species may be produced by selective breeding; just as a physical philosopher may accept the undulatory theory of light, subject

to the proof of the existence of the hypothetical ether; or as the chemist adopts the atomic theory, subject to the proof of the existence of atoms; and for exactly the same reasons, namely, that it has an immense amount of *primâ facie* probability: that it is the only means at present within reach of reducing the chaos of observed facts to order; and lastly, that it is the most powerful instrument of investigation which has been presented to naturalists since the invention of the natural system of classification, and the commencement of the systematic study of embryology.

But even leaving Mr. Darwin's views aside, the whole analogy of natural operations furnishes so complete and crushing an argument against the intervention of any but what are termed secondary causes, in the production of all the phenomena of the universe; that, in view of the intimate relations between Man and the rest of the living world, and between the forces exerted by the latter and all other forces, I can see no excuse for doubting that all are co-ordinated terms of Nature's great progression, from the formless to the formed—from the inorganic to the organic—from blind force to conscious intellect and will.

Science has fulfilled her function when she has ascertained and enunciated truth; and were these pages addressed to men of science only, I should now close this Essay, knowing that my colleagues have learned to respect nothing but evidence, and to believe that their highest duty lies in submitting to it, however it may jar against their inclinations.

But, desiring, as I do, to reach the wider circle of the intelligent public, it would be unworthy cowardice were I to ignore the repugnance with which the majority of my readers are likely to meet the conclusions to which the most careful and conscientious study I have been able to give to this matter, has led me.

On all sides I shall hear the cry—"We are men and women, not a mere better sort of apes, a little longer in the leg, more compact in the foot, and bigger in brain than your brutal Chimpanzees and Gorillas. The power of knowledge—the conscience of good and evil—the pitiful tenderness of human affections, raise us out of all real fellowship with the brutes, however closely they may seem to approximate us."

To this I can only reply that the exclamation would be most just and would have my own entire sympathy, if it were only relevant. But, it is not I who seek to base Man's dignity upon his great toe, or insinuate that we are lost if an Ape has a hippocampus minor. On the contrary, I have done my best to sweep away this vanity. I have endeavoured to show that no absolute structural line of demarcation, wider than that between the animals which immediately succeed us in the scale, can be drawn between the animal world and ourselves; and I may add the expression of my belief that the attempt to draw a psychical distinction is equally futile, and that even the highest faculties of feeling and of intellect begin to germinate in lower forms of life. At the

same time, no one is more strongly convinced than I am of the vastness of the gulf between civilised man and the brutes; or is more certain that whether *from* them or not, he is assuredly not *of* them. No one is less disposed to think lightly of the present dignity, or despairingly of the future hopes, of the only consciously intelligent denizen of this world.

We are indeed told by those who assume authority in these matters, that the two sets of opinions are incompatible, and that the belief in the unity of origin of man and brutes involves the brutalization and degradation of the former. But is this really so? Could not a sensible child confute by obvious arguments, the shallow rhetoricians who would force this conclusion upon us? Is it, indeed, true, that the Poet, or the Philosopher, or the Artist whose genius is the glory of his age, is degraded from his high estate by the undoubted historical probability, not to say certainty, that he is the direct descendant of some naked and bestial savage, whose intelligence was just sufficient to make him a little more cunning than the Fox, and by so much more dangerous than the Tiger? Or is he bound to howl and grovel on all fours because of the wholly unquestionable fact, that he was once an egg, which no ordinary power of discrimination could distinguish from that of a Dog? Or is the philanthropist, or the saint, to give up his endeavours to lead a noble life, because the simplest study of man's nature reveals, at its foundations, all the selfish passions, and fierce appetites of the merest quadruped? Is mother-love vile because a hen shows it, or fidelity base because dogs possess it?

The common sense of the mass of mankind will answer these questions without a moment's hesitation. Healthy humanity, finding itself hard pressed to escape from real sin and degradation, will leave the brooding over speculative pollution to the cynics and the "righteous overmuch" who, disagreeing in everything else, unite in blind insensibility to the nobleness of the visible world, and in inability to appreciate the grandeur of the place Man occupies therein.

Nay more, thoughtful men, once escaped from the blinding influences of traditional prejudice, will find in the lowly stock whence Man has sprung, the best evidence of the splendour of his capacities; and will discern in his long progress through the Past, a reasonable ground of faith in his attainment of a nobler Future.

They will remember that in comparing civilised man with the animal world, one is as the Alpine traveller, who sees the mountains soaring into the sky and can hardly discern where the deep shadowed crags and roseate peaks end, and where the clouds of heaven begin. Surely the awe-struck voyager may be excused if, at first, he refuses to believe the geologist, who tells him that these glorious masses are, after all, the hardened mud of primeval seas, or the cooled slag of subterranean furnaces—of one substance with the dullest clay, but raised by inward forces to that place of proud and seemingly inaccessible glory.

But the geologist is right; and due reflection on his teachings, instead of diminishing our reverence and our wonder, adds all the force of intellectual sublimity to the mere æsthetic intuition of the uninstructed beholder.

And after the passion and prejudice have died away, the same result will attend the teachings of the naturalist respecting that great Alps and Andes of the living world—Man. Our reverence for the nobility of manhood will not be lessened by the knowledge that Man is, in substance and in structure, one with the brutes; for, he alone possesses the marvellous endowment of intelligible and rational speech, whereby, in the secular period of his existence, he has slowly accumulated and organised the experience which is almost wholly lost with the cessation of every individual life in other animals; so that, now, he stands raised upon it as on a mountain top, far above the level of his humble fellows, and transfigured from his grosser nature by reflecting, here and there, a ray from the infinite source of truth.

7. THE MENTAL POWERS OF MAN AND THE LOWER ANIMALS¹

By CHARLES DARWIN

My object in this chapter is to show that there is no fundamental difference between man and the higher mammals in their mental faculties. Each division of the subject might have been extended into a separate essay, but must here be treated briefly. As no classification of the mental powers has been universally accepted, I shall arrange my remarks in the order most convenient for my purpose; and will select those facts which have struck me most, with the hope that they may produce some effect on the reader. . . .

As man possesses the same senses as the lower animals, his fundamental intuitions must be the same. Man has also some few instincts in common, as that of self preservation, sexual love, the love of the mother for her newborn offspring, the desire possessed by the latter to suck, and so forth. But man, perhaps, has somewhat fewer instincts than those possessed by the animals which come next to him in the series. The orang in the Eastern islands, and the chimpanzee in Africa, build platforms on which they sleep; and, as both species follow the same habit, it might be argued that this was due to instinct, but we cannot feel sure that it is not the result of both animals having similar wants, and possessing similar powers of reasoning. These apes, as we may assume, avoid the many poisonous fruits of the tropics, and man has no such knowledge: but as our domestic animals, when taken to foreign lands, and when first turned out in the spring, often eat poisonous herbs, which they afterwards avoid, we cannot feel sure that the apes do not learn from their own experience or from that of their parents what fruits to select. It is, however, certain, as we shall presently see, that apes have an instinctive dread of serpents, and probably of other dangerous animals.

The fewness and the comparative simplicity of the instincts in the higher animals are remarkable in contrast with those of the lower animals. Cuvier maintained that instinct and intelligence stand in an inverse ratio to each other; and some have thought that the intellectual faculties of the higher animals have been gradually developed from their instincts. But Pouchet, in an interesting essay, has shown that no such inverse ratio really exists. Those insects which possess the most wonderful instincts are certainly the most intelligent. In the vertebrate series, the least intelligent members,

¹From Chapter 3, "Comparison of the Mental Powers of Man and the Lower Animals," of *The Descent of Man*, by Charles Darwin, first published in 1871.

namely fishes and amphibians, do not possess complex instincts; and amongst mammals the animal most remarkable for its instincts, namely the beaver, is highly intelligent, as will be admitted by every one who has read Mr. Morgan's excellent work.

Although the first dawns of intelligence, according to Mr. Herbert Spencer, have been developed through the multiplication and co-ordination of reflex actions, and although many of the simpler instincts graduate into reflex actions, and can hardly be distinguished from them, as in the case of young animals sucking, yet the most complex instincts seem to have originated independently of intelligence. I am, however, very far from wishing to deny that instinctive actions may lose their fixed and untaught character, and be replaced by others performed by the aid of the free will. . . .

Although, as we learn from the above-mentioned insects and the beaver, a high degree of intelligence is certainly compatible with complex instincts, and although actions, at first learned voluntarily can soon through habit be performed with the quickness and certainty of a reflex action, yet it is not improbable that there is a certain amount of interference between the development of free intelligence and of instinct,—which latter implies some inherited modification of the brain. Little is known about the functions of the brain, but we can perceive that as the intellectual powers become highly developed, the various parts of the brain must be connected by very intricate channels of the freest intercommunication; and as a consequence, each separate part would perhaps tend to be less well fitted to answer to particular sensations or associations in a definite and inherited—that is instinctive—manner. There seems even to exist some relation between a low degree of intelligence and a strong tendency to the formation of fixed, though not inherited habits; for as a sagacious physician remarked to me, persons who are slightly imbecile tend to act in everything by routine or habit; and they are rendered much happier if this is encouraged. . . .

The fact that the lower animals are excited by the same emotions as ourselves is so well established, that it will not be necessary to weary the reader by many details. Terror acts in the same manner on them as on us, causing the muscles to tremble, the heart to palpitate, the sphincters to be relaxed, and the hair to stand on end. Suspicion, the offspring of fear, is eminently characteristic of most wild animals. It is, I think, impossible to read the account given by Sir E. Tennent, of the behavior of the female elephants, used as decoys, without admitting that they intentionally practice deceit, and well know what they are about. Courage and timidity are extremely variable qualities in the individuals of the same species, as is plainly seen in our dogs. Some dogs and horses are ill-tempered, and easily turn sulky; others are good-tempered; and these qualities are certainly inherited. Every one knows how liable animals are to furious rage, and how plainly they show it. Many, and probably true, anecdotes have been published on the long-delayed and artful revenge of various animals. The accurate Rengger, and

Brehm state that the American and African monkeys which they kept tame, certainly revenged themselves. Sir Andrew Smith, a zoologist whose scrupulous accuracy was known to many persons, told me the following story of which he was himself an eye-witness; at the Cape of Good Hope an officer had often plagued a certain baboon, and the animal, seeing him approaching one Sunday for parade, poured water into a hole and hastily made some thick mud, which he skillfully dashed over the officer as he passed by, to the amusement of many bystanders. For long afterwards the baboon rejoiced and triumphed whenever he saw his victim.

The love of a dog for his master is notorious; as an old writer quaintly says, "A dog is the only thing on this earth that luv's you more than he luv's himself."

In the agony of death a dog has been known to caress his master, and every one has heard of the dog suffering under vivisection, who licked the hand of the operator; this man, unless the operation was fully justified by an increase of our knowledge, or unless he had a heart of stone, must have felt remorse to the last hour of his life. . . .

Most of the more complex emotions are common to the higher animals and ourselves. Every one has seen how jealous a dog is of his master's affection, if lavished on any other creature; and I have observed the same fact with monkeys. This shows that animals not only love, but have desire to be loved. Animals manifestly feel emulation. They love approbation or praise; and a dog carrying a basket for his master exhibits in a high degree self-complacency or pride. There can, I think, be no doubt that a dog feels shame, as distinct from fear, and something very like modesty when begging too often for food. A great dog scorns the snarling of a little dog, and this may be called magnanimity. Several observers have stated that monkeys certainly dislike being laughed at; and they sometimes invent imaginary offenses. In the Zoological Gardens I saw a baboon who always got into a furious rage when his keeper took out a letter or book and read it aloud to him; and his rage was so violent that, as I witnessed on one occasion, he bit his own leg till the blood flowed. Dogs show what may be fairly called a sense of humor, as distinct from mere play; if a bit of stick or other such object be thrown to one, he will often carry it away for a short distance; and then squatting down with it on the ground close before him, will wait until his master comes quite close to take it away. The dog will then seize it and rush away in triumph, repeating the same manœuvre, and evidently enjoying the practical joke.

We will now turn to the more intellectual emotions and faculties, which are very important, as forming the basis for the development of the higher mental powers. Animals manifestly enjoy excitement, and suffer from ennui, as may be seen with dogs, and, according to Rengger, with monkeys. All animals feel Wonder, and many exhibit Curiosity. They sometimes suffer from this latter quality, as when the hunter plays antics and thus attracts them; I witnessed this with deer, and so it is with the wary chamois, and with

some kinds of wild-ducks. Brehm gives a curious account of the instinctive dread, which his monkeys exhibited, for snakes; but their curiosity was so great that they could not desist from occasionally satiating their horror in a most human fashion, by lifting up the lid of the box in which the snakes were kept. I was so much surprised at his account, that I took a stuffed and coiled-up snake into the monkey-house at the Zoological Gardens, and the excitement thus caused was one of the most curious spectacles which I ever beheld. Three species of *Cercopithecus* were the most alarmed; they dashed about their cages, and uttered sharp signal cries of danger, which were understood by the other monkeys. A few young monkeys and one old Anubis baboon alone took no notice of the snake. I then placed the stuffed specimen on the ground in one of the larger compartments. After a time all the monkeys collected round it in a large circle, and staring intently, presented a most ludicrous appearance. They became extremely nervous; so that when a wooden ball, with which they were familiar as a plaything, was hidden, they all instantly started away. These monkeys behaved very differently when a dead fish, a mouse, a living turtle, and other new objects were placed in their cages; for though at first frightened, they soon approached, handled and examined them. I then placed a live snake in a paper bag, with the mouth loosely closed, in one of the larger compartments. One of the monkeys immediately approached, cautiously opened the bag a little, peeped in, and instantly dashed away. Then I witnessed what Brehm has described, for monkey after monkey, with head raised high and turned on one side, could not resist taking a momentary peep into the upright bag, at the dreadful object lying quietly at the bottom. It would almost appear as if monkeys had some notion of zoological affinities, for those kept by Brehm exhibited a strange, though mistaken, instinctive dread of innocent lizards and frogs. An orang, also, has been known to be much alarmed at the first sight of a turtle. . . .

Hardly any faculty is more important for the intellectual progress of man than Attention. Animals clearly manifest this power, as when a cat watches by a hole and prepares to spring on its prey. Wild animals sometimes become so absorbed when thus engaged, that they may be easily approached. Mr. Bartlett has given me a curious proof how variable this faculty is in monkeys. A man who trains monkeys to act in plays, used to purchase common kinds from the Zoological Society at the price of five pounds for each; but he offered to give double the price, if he might keep three or four of them for a few days, in order to select one. When asked how he could possibly learn so soon, whether a particular monkey would turn out a good actor, he answered that it all depended on their power of attention. If, when he was talking and explaining anything to a monkey, its attention was easily distracted, as by a fly on the wall or other trifling object, the case was hopeless. If he tried by punishment to make an inattentive monkey act, it turned sulky. On the other hand, a monkey which carefully attended to him could always be trained. . . .

Of all the faculties of the human mind, it will, I presume, be admitted that Reason stands at the summit. Only a few persons now dispute that animals possess some power of reasoning. Animals may constantly be seen to pause, deliberate, and resolve. It is a significant fact, that the more the habits of any particular animal are studied by a naturalist, the more he attributes to reason and the less to unlearned instincts. In future chapters we shall see that some animals extremely low in the scale apparently display a certain amount of reason. No doubt it is often difficult to distinguish between the power of reason and that of instinct. For instance, Dr. Hayes, in his work on "*The Open Polar Sea*," repeatedly remarks that his dogs, instead of continuing to draw the sledges in a compact body, diverged and separated when they came to thin ice, so that their weight might be more evenly distributed. This was often the first warning which the travelers received that the ice was becoming thin and dangerous. Now, did the dogs act thus from the experience of each individual, or from the example of the older and wiser dogs, or from an inherited habit, that is from instinct? This instinct, may possibly have arisen since the time, long ago, when dogs were first employed by the natives in drawing their sledges; or the Arctic wolves, the parent-stock of the Esquimaux dog, may have acquired an instinct, impelling them not to attack their prey in a close pack, when on thin ice.

We can only judge by the circumstances under which actions are performed, whether they are due to instinct, or to reason, or to the mere association of ideas: this latter principle, however, is intimately connected with reason. A curious case has been given by Prof. Möbius, of a pike, separated by a plate of glass from an adjoining aquarium stocked with fish, and who often dashed himself with such violence against the glass in trying to catch the other fishes, that he was sometimes completely stunned. The pike went on thus for three months, but at last learned caution, and ceased to do so. The plate of glass was then removed, but the pike would not attack these particular fishes, though he would devour others which were afterward introduced; so strongly was the idea of a violent shock associated in his feeble mind with the attempt on his former neighbors. If a savage, who had never seen a large plate-glass window, were to dash himself even once against it, he would for a long time afterwards associate a shock with a window-frame; but very differently from the pike, he would probably reflect on the nature of the impediment, and be cautious under analogous circumstances. Now with monkeys, as we shall presently see, a painful or merely a disagreeable impression, from an action once performed, is sometimes sufficient to prevent the animal from repeating it. If we attribute this difference between the monkey and the pike solely to the association of ideas being so much stronger and more persistent in the one than the other, though the pike often received much the more severe injury, can we maintain in the case of man that a similar difference implies the possession of a fundamentally different mind?

Houzeau relates that, whilst crossing a wide and arid plain in Texas, his two dogs suffered greatly from thirst, and that between thirty and forty times they rushed down the hollows to search for water. These hollows were not valleys, and there were no trees in them, or any other difference in the vegetation, and as they were absolutely dry there could have been no smell of damp earth. The dogs behaved as if they knew that a dip in the ground offered them the best chance of finding water, and Houzeau has often witnessed the same behavior in other animals.

I have seen, as I daresay have others, that when a small object is thrown on the ground beyond the reach of one of the elephants in the Zoological Gardens, he blows through his trunk on the ground beyond the object, so that the current reflected on all sides may drive the object within his reach. Again a well-known ethnologist, Mr. Westropp, informs me that he observed in Vienna a bear deliberately making with his paw a current in some water, which was close to the bars of his cage, so as to draw a piece of floating bread within his reach. These actions of the elephant and bear can hardly be attributed to instinct or inherited habit, as they would be of little use to an animal in a state of nature. Now, what is the difference between such actions, when performed by an uncultivated man, and by one of the higher animals?...

The promptings of reason, after very short experience, are well shown by the following actions of American monkeys, which stand low in their order. Rengger, a most careful observer, states that when he first gave eggs to his monkeys in Paraguay, they smashed them, and thus lost much of their contents; afterwards they gently hit one end against some hard body, and picked off the bits of shell with their fingers. After cutting themselves only once with any sharp tool they would not touch it again, or would handle it with the greatest caution. Lumps of sugar were often given them wrapped up in paper; and Rengger sometimes put a live wasp in the paper, so that in hastily unfolding it they got stung; after this had once happened, they always first held the packet to their ears to detect any movement within.

The following cases relate to dogs. Mr. Colquhoun winged two wild-ducks, which fell on the further side of a stream; his retriever tried to bring over both at once, but could not succeed; she then, though never before known to ruffle a feather, deliberately killed one, brought over the other, and returned for the dead bird. Col. Hutchinson relates that two partridges were shot at once, one being killed, the other wounded; the latter ran away, and was caught by the retriever, who on her return came across the dead bird; "she stopped, evidently "greatly puzzled, and after one or two trials, finding she could not take it "up without permitting the escape of the winged bird, she considered a moment, "then deliberately murdered it by giving it a severe crunch, and afterwards "brought away both together. This was the only known instance of her "ever having willfully injured any game." Here we have reason though not quite perfect, for the retriever might have brought the wounded bird first and then returned for the dead one, as in the case of the two wild-ducks. I

give the above cases, as resting on the evidence of two independent witnesses, and because in both instances the retrievers, after deliberation, broke through a habit which is inherited by them (that of not killing the game retrieved), and because they show how strong their reasoning faculty must have been to overcome a fixed habit. . . .

It has, I think, now been shown that man and the higher animals, especially the Primates, have some few instincts in common. All have the same senses, intuitions, and sensations,—similar passions, affections, and emotions, even the more complex ones, such as jealousy, suspicion, emulation, gratitude, and magnanimity; they practice deceit and are revengeful; they are sometimes susceptible to ridicule, and even have a sense of humor; they feel wonder and curiosity; they possess the same faculties of imitation, attention, deliberation, choice, memory, imagination, the association of ideas, and reason, though in very different degrees. The individuals of the same species graduate in intellect from absolute imbecility to high excellence.

8. THE MAN-LIKE APES¹

By THOMAS H. HUXLEY

THE GIBBONS

Of the Gibbons, half a dozen species are found scattered over the Asiatic islands, Java, Sumatra, Borneo, and through Malacca, Siam, Arracan, and an uncertain extent of Hindostan, on the main land of Asia. The largest attain a few inches above three feet in height, from the crown to the heel, so that they are shorter than the other man-like Apes; while the slenderness of their bodies renders their mass far smaller in proportion even to this diminished height.

Dr. Salomon Müller, an accomplished Dutch naturalist, who lived for many years in the Eastern Archipelago, and to the results of whose personal experience I shall frequently have occasion to refer, states that the Gibbons are true mountaineers, loving the slopes and edges of the hills, though they rarely ascend beyond the limit of the fig-trees. All day long they haunt the tops of the tall trees; and though, towards evening, they descend in small troops to the open ground, no sooner do they spy a man than they dart up the hill-sides, and disappear in the darker valleys.

All observers testify to the prodigious volume of voice possessed by these animals. According to the writer whom I have just cited, in one of them, the Siamang, "the voice is grave and penetrating, resembling the sounds gōek, gōek, gōek, gōek, goek ha ha ha haaāāā, and may easily be heard at a distance of half a league." While the cry is being uttered, the great membranous bag under the throat which communicates with the organ of voice, the so-called "laryngeal sac," becomes greatly distended, diminishing again when the creature relapses into silence.

M. Duvaucel, likewise, affirms that the cry of the Siamang may be heard for miles—making the woods ring again. So Mr. Martin describes the cry of the agile Gibbon as "overpowering and deafening" in a room, and "from its strength, well calculated for resounding through the vast forests." Mr. Waterhouse, an accomplished musician as well as zoologist, says, "The Gibbon's voice is certainly much more powerful than that of any singer I ever heard." And yet it is to be recollected that this animal is not half the height of, and far less bulky in proportion than, a man.

¹From Thomas H. Huxley, *Man's Place in Nature and Other Anthropological Essays*, first essay: "The Man-like Apes." Published 1863.

There is good testimony that various species of Gibbon readily take to the erect posture. Mr. George Bennett, a very excellent observer, in describing the habits of a male *Hylobates syndactylus* which remained for some time in his possession, says: "He invariably walks in the erect posture when on a level surface; and then the arms either hang down, enabling him to assist himself with his knuckles; or what is more usual, he keeps his arms uplifted in nearly an erect position, with the hands pendent ready to seize a rope, and climb up on the approach of danger or on the obtrusion of strangers. He walks rather quick in the erect posture, but with a waddling gait, and is soon run down if, whilst pursued, he has no opportunity of escaping by climbing When he walks in the erect posture he turns the leg and foot outwards, which occasions him to have a waddling gait and to seem bow-legged". . . .

But level ground is not the place where these animals can display their very remarkable and peculiar locomotive powers, and that prodigious activity which almost tempts one to rank them among flying, rather than among ordinary climbing mammals.

Mr. Martin has given so excellent and graphic an account of the movements of a *Hylobates agilis*, living in the Zoological Gardens, in 1840, that I will quote it in full:

"It is almost impossible to convey in words an idea of the quickness and graceful address of her movements: they may indeed be termed aerial, as she seems merely to touch in her progress the branches among which she exhibits her evolutions. In these feats her hands and arms are the sole organs of locomotion; her body hanging as if suspended by a rope, sustained by one hand (the right for example), she launches herself, by an energetic movement, to a distant branch, which she catches with the left hand; but her hold is less than momentary: the impulse for the next launch is acquired: the branch then aimed at is attained by the right hand again and quitted instantaneously, and so on in alternate succession. In this manner spaces of twelve and eighteen feet are cleared, with the greatest ease and uninterruptedly, for hours together, without the slightest appearance of fatigue being manifested; and it is evident that if more space could be allowed, distances very greatly exceeding eighteen feet would be as easily cleared; so that Duvaucel's assertion that he had seen these animals launch themselves from one branch to another, forty feet asunder, startling as it is, may be well credited. Sometimes, on seizing a branch in her progress, she will throw herself, by the power of one arm only, completely round it, making a revolution with such rapidity as almost to deceive the eye, and continue her progress with undiminished velocity. It is singular to observe how suddenly this Gibbon can stop, when the impetus given by the rapidity and distance of her swinging leaps would seem to require a gradual abatement of her movements. In the very midst of her flight a branch is seized, the body raised, and she is seen, as if by magic, quietly seated on it, grasping it with her feet. As suddenly she again throws herself into action.

"The following facts will convey some notion of her dexterity and quickness. A live bird was let loose in her apartment; she marked its flight, made a long swing to a distant branch, caught the bird with one hand in her passage, and attained the branch with her other hand; her aim, both at the bird and at the branch, being as successful as if one object only had engaged her atten-

tion. It may be added that she instantly bit off the head of the bird, picked its feathers, and then threw it down without attempting to eat it.

"On another occasion this animal swung herself from a perch, across a passage at least twelve feet wide, against a window which it was thought would be immediately broken: but not so; to the surprise of all, she caught the narrow framework between the panes with her hand, in an instant attained the proper impetus, and sprang back again to the cage she had left—a feat requiring not only great strength, but the nicest precision."

The Gibbons appear to be naturally very gentle, but there is very good evidence that they will bite severely when irritated—a female *Hylobates agilis* having so severely lacerated one man with her long canines, that he died; while she had injured others so much that, by way of precaution, these formidable teeth had been filed down; but, if threatened, she would still turn on her keeper. The Gibbons eat insects, but appear generally to avoid animal food. A Siamang, however, was seen by Mr. Bennett to seize and devour greedily a live lizard. They commonly drink by dipping their fingers in the liquid and then licking them. It is asserted that they sleep in a sitting posture.

Duvaucel affirms that he has seen the females carry their young to the waterside and their wash their faces, in spite of resistance and cries. They are gentle and affectionate in captivity—full of tricks and pettishness, like spoiled children, and yet not devoid of a certain conscience, as an anecdote, told by Mr. Bennett, will show. It would appear that his Gibbon had a peculiar inclination for disarranging things in the cabin. Among these articles, a piece of soap would especially attract his notice, and for the removal of this he had been once or twice scolded. "One morning," says Mr. Bennett, "I was writing, the ape being present in the cabin, when casting my eyes towards him, I saw the little fellow taking the soap. I watched him without his perceiving that I did so: and he occasionally would cast a furtive glance towards the place where I sat. I pretended to write; he, seeing me busily occupied, took the soap, and moved away with it in his paw. When he had walked half the length of the cabin, I spoke quietly, without frightening him. The instant he found I saw him, he walked back again, and deposited the soap nearly in the same place from whence he had taken it. There was certainly something more than instinct in that action: he evidently betrayed a consciousness of having done wrong both by his first and last actions—and what is reason if that is not an exercise of it?" . . .

THE ORANG-UTAN

The Orang-Utan would rarely seem to exceed four feet in height, but the body is very bulky, measuring two-thirds of the height in circumference.

The Orang-Utan is found only in Sumatra and Borneo, and is common in neither of these islands—in both of which it occurs always in low, flat plains, never in the mountains. It loves the densest and most sombre of the forests,

which extend from the sea-shore inland, and thus is found only in the eastern half of Sumatra, where alone such forests occur, though, occasionally, it strays over to the western side.

On the other hand, it is generally distributed through Borneo, except in the mountains, or where the population is dense. In favourable places, the hunter may, by good fortune, see three or four in a day.

Except in the pairing time, the old males usually live by themselves. The old females, and the immature males, on the other hand, are often met with in twos and threes; and the former occasionally have young with them, though the pregnant females usually separate themselves, and sometimes remain apart after they have given birth to their offspring. The young Orangs seem to remain unusually long under their mother's protection, probably in consequence of their slow growth. While climbing, the mother always carries her young against her bosom, the young holding on by his mother's hair. At what time of life the Orang-Utan becomes capable of propagation, and how long the females go with young, is unknown, but it is probable that they are not adult until they arrive at ten or fifteen years of age. A female which lived for five years at Batavia had not attained one-third the height of the wild females. It is probable that, after reaching adult years, they go on growing, though slowly, and that they live to forty or fifty years. The Dyaks tell of old Orangs, which have not only lost all their teeth, but which find it so troublesome to climb, that they maintain themselves on windfalls and juicy herbage.

The Orang is sluggish, exhibiting none of that marvellous activity characteristic of the Gibbons. Hunger alone seems to stir him to exertion, and when it is stilled, he relapses into repose. When the animal sits, it curves its back and bows its head, so as to look straight down on the ground; sometimes it holds on with its hands by a higher branch, sometimes lets them hang phlegmatically down by its side—and in these positions the Orang will remain, for hours together, in the same spot, almost without stirring, and only now and then giving utterance to his deep, growling voice. By day he usually climbs from one tree-top to another, and only at night descends to the ground, and if then threatened with danger, he seeks refuge among the underwood. When not hunted, he remains a long time in the same locality, and sometimes stops for many days on the same tree—a firm place among its branches serving him for a bed. It is rare for the Orang to pass the night in the summit of a large tree, probably because it is too windy and cold there for him; but, as soon as night draws on, he descends from the height and seeks out a fit bed in the lower and darker part, or in the leafy top of a small tree, among which he prefers Nibong Palms, Pandani, or one of those parasitic Orchids which give the primæval forests of Borneo so characteristic and striking an appearance. But wherever he determines to sleep, there he prepares himself a sort of nest: little boughs and leaves are drawn together round the selected spot, and bent crosswise over one another; while to make the bed soft, great leaves of Ferns,

of Orchids, of *Pandanus fascicularis*, *Nipa fruticans*, etc., are laid over them. Those which Müller saw, many of them being very fresh, were situated at a height of ten to twenty-five feet above the ground, and had a circumference, on the average, of two or three feet. Some were packed many inches thick with *Pandanus* leaves; others were remarkable only for the cracked twigs, which, united in a common centre, formed a regular platform. "The rude hut," says Sir James Brooke, "which they are stated to build in the trees, would be more properly called a seat or nest, for it has no roof or cover of any sort. The facility with which they form this nest is curious, and I have had an opportunity of seeing a wounded female weave the branches together and seat herself, within a minute."

According to the Dyaks the Orang rarely leaves his bed before the sun is well above the horizon and has dissipated the mists. He gets up about nine, and goes to bed again about five; but sometimes not till late in the twilight. He lies sometimes on his back; or, by way of change, turns on one side or the other, drawing his limbs up to his body, and resting his head on his hand. When the night is cold, windy, or rainy, he usually covers his body with a heap of *Pandanus*, *Nipa*, or Fern leaves, like those of which his bed is made, and he is especially careful to wrap up his head in them. It is this habit of covering himself up which has probably led to the fable that the Orang builds huts in the trees . . .

An Orang climbs so slowly and cautiously, as, in this act, to resemble a man more than an ape, taking great care of his feet, so that injury of them seems to affect him far more than it does other apes. Unlike the Gibbons, whose forearms do the greater part of the work, as they swing from branch to branch, the Orang never makes even the smallest jump. In climbing, he moves alternately one hand and one foot, or, after having laid fast hold with the hands, he draws up both feet together. In passing from one tree to another, he always seeks out a place where the twigs of both come close together, or interlace. Even when closely pursued, his circumspection is amazing: he shakes the branches to see if they will bear him, and then bending an overhanging bough down by throwing his weight gradually along it, he makes a bridge from the tree he wishes to quit to the next.

On the ground the Orang always goes laboriously and shakily, on all fours. At starting he will run faster than a man, though he may soon be overtaken. The very long arms which, when he runs, are but little bent, raise the body of the Orang remarkably, so that he assumes much the posture of a very old man bent down by age, and making his way along by the help of a stick. In walking, the body is usually directed straight forward, unlike the other apes, which run more or less obliquely; except the Gibbons, who in these as in so many other respects, depart remarkably from their fellows.

The Orang cannot put his feet flat on the ground, but is supported upon their outer edges, the heel resting more on the ground, while the curved toes partly rest upon the ground by the upper side of their first joint, the two outer-

most toes of each foot completely resting on this surface. The hands are held in the opposite manner, their inner edges serving as the chief support. The fingers are then bent out in such a manner that their foremost joints, especially those of the two innermost fingers, rest upon the ground by their upper sides, while the point of the free and straight thumb serves as an additional fulcrum.

The Orang never stands on its hind legs, and all the pictures, representing it as so doing, are as false as the assertion that it defends itself with sticks, and the like.

The long arms are of especial use, not only in climbing, but in the gathering of food from boughs to which the animal could not trust his weight. Figs, blossoms, and young leaves of various kinds, constitute the chief nutriment of the Orang; but strips of bamboo two or three feet long were found in the stomach of a male. They are not known to eat living animals.

Although, when taken young, the Orang-Utan soon becomes domesticated, and indeed seems to court human society, it is naturally a very wild and shy animal, though apparently sluggish and melancholy. The Dyaks affirm, that when the old males are wounded with arrows only, they will occasionally leave the trees and rush raging upon their enemies, whose sole safety lies in instant flight, as they are sure to be killed if caught.

But, though possessed of immense strength, it is rare for the Orang to attempt to defend itself, especially when attacked with fire-arms. On such occasions he endeavours to hide himself, or to escape along the topmost branches of the trees, breaking off and throwing down the boughs as he goes. When wounded he betakes himself to the highest attainable point of the tree, and emits a singular cry, consisting at first of high notes, which at length deepen into a low roar, not unlike that of a panther. While giving out the high notes the Orange thrusts out his lips into a funnel shape; but in uttering the low notes he holds his mouth wide open, and at the same time the great throat bag, or laryngeal sac, becomes distended . . .

THE CHIMPANZEE

The adult Chimpanzees measured by Dr. Savage, never exceeded, though the males may almost attain, five feet in height.

"When at rest the sitting posture is that generally assumed. They are sometimes seen standing and walking, but when thus detected, they immediately take to all fours, and flee from the presence of the observer. Such is their organisation that they cannot stand erect, but lean forward. Hence they are seen, when standing, with the hands clasped over the occiput, or the lumbar region, which would seem necessary to balance or ease of posture.

"The toes of the adult are strongly flexed and turned inwards, and cannot be perfectly straightened. In the attempt the skin gathers into thick folds on the back, showing that the full expansion of the foot, as is necessary in walking, is unnatural. The natural position is on all fours, the body anteriorly

resting upon the knuckles. These are greatly enlarged, with the skin protuberant and thickened like the sole of the foot.

"They are expert climbers, as one would suppose from their organisation. In their gambols they swing from limb to limb to a great distance, and leap with astonishing agility. It is not unusual to see the 'old folks' (in the language of an observer) sitting under a tree regaling themselves with fruit and friendly chat, while their 'children' are leaping around them, and swinging from tree to tree with boisterous merriment.

"As seen here, they cannot be called *gregarious*, seldom more than five, or ten at most, being found together. It has been said, on good authority, that they occasionally assemble in large numbers, in gambols. My informant asserts that he saw once not less than fifty so engaged; hooting, screaming, and drumming with sticks upon old logs, which is done in the latter case with equal facility by the four extremities. They do not appear ever to act on the offensive, and seldom, if ever really, on the defensive. When about to be captured, they resist by throwing their arms about their opponent, and attempting to draw him into contact with their teeth."

With respect to this last point Dr. Savage is very explicit in another place:

"*Biting* is their principal art of defence. I have seen one man who had been thus severely wounded in the feet.

"The strong development of the canine teeth in the adult would seem to indicate a carnivorous propensity; but in no state save that of domestication do they manifest it. At first they reject flesh, but easily acquire a fondness for it. The canines are early developed, and evidently designed to act the important part of weapons of defence. When in contact with man almost the first effort of the animal is—to bite.

"They avoid the abodes of men, and build their habitations in trees. Their construction is more that of *nests* than *huts*, as they have been erroneously termed by some naturalists. They generally build not far above the ground. Branches or twigs are bent, or partly broken, and crossed, and the whole supported by the body of a limb or a crotch. Sometimes a nest will be found near the end of a *strong leafy branch* twenty or thirty feet from the ground. One I have lately seen that could not be less than forty feet, and more probably it was fifty. But this is an unusual height. . . .

"They are very filthy in their habits. . . . It is a tradition with the natives generally here, that they were once members of their own tribe: that for their depraved habits they were expelled from all human society, and, that through an obstinate indulgence of their vile propensities, they have degenerated into their present state of organisation. They are, however, eaten by them, and when cooked with the oil and pulp of the palm-nut considered a highly palatable morsel.

"They exhibit a remarkable degree of intelligence in their habits, and, on the part of the mother, much affection for their young. The second female described was upon a tree when first discovered, with her mate and two young ones (a male and a female). Her first impulse was to descend with great rapidity and make off into the thicket, with her mate and female offspring. The young male remaining behind, she soon returned to the rescue. She ascended and took him in her arms, at which moment she was shot, the ball passing through the fore-arm of the young one, on its way to the heart of the mother. . . .

"In a recent case, the mother, when discovered, remained upon the tree with her offspring, watching intently the movements of the hunter. As he took aim, she motioned with her hand, precisely in the manner of a human being, to have him desist and go away. When the wound has not proved

instantly fatal, they have been known to stop the flow of blood by pressing with the hand upon the part, and when this did not succeed, to apply leaves and grass. . . . When shot, they give a sudden screech, not unlike that of a human being in sudden and acute distress."

The ordinary voice of the Chimpanzee, however, is affirmed to be hoarse, guttural, and not very loud, somewhat like "whoo-whoo." . . .

THE GORILLA

The same excellent observer, from whom I have borrowed the preceding account of the habits of the adult Chimpanzee, published fifteen years ago, an account of the Gorilla, which has, in its most essential points, been confirmed by subsequent observers, and to which so very little has really been added that in justice to Dr. Savage I give it almost in full. . . .

"The most remarkable feature of the head is a high ridge, or crest of hair, in the course of the sagittal suture, which meets posteriorly with a transverse ridge of the same, but less prominent, running round from the back of one ear to the other. The animal has the power of moving the scalp freely forward and back, and when enraged is said to contract it strongly over the brow, thus bringing down the hairy ridge and pointing the hair forward, so as to present an indescribably ferocious aspect.

"Neck short, thick, and hairy; chest and shoulders very broad, said to be fully double the size of the *Enchéekos* [Chimpanzee]; arms very long, reaching some way below the knee—the fore-arm much the shortest; hands very large, the thumbs much larger than the fingers . . .

"The gait is shuffling; the motion of the body, which is never upright as in man, but bent forward, is somewhat rolling, or from side to side. The arms being longer than the Chimpanzee, it does not stoop as much in walking; like that animal, it makes progression by thrusting its arms forward, resting the hands on the ground, and then giving the body a half jumping, half swinging motion between them. In this act it is said not to flex the fingers, as does the Chimpanzee, resting on its knuckles, but to extend them, making a fulcrum of the hand. When it assumes the walking posture, to which it is said to be much inclined, it balances its huge body by flexing its arms upward.

"They live in bands, but are not so numerous as the Chimpanzees; the females generally exceed the other sex in number. My informants all agree in the assertion that but one adult male is seen in a band; that when the young males grow up, a contest takes place for mastery, and the strongest, by killing and driving out the others, establishes himself as the head of the community."

Dr. Savage repudiates the stories about the Gorillas carrying off women and vanquishing elephants and then adds—

"Their dwellings, if they may be so called, are similar to those of the Chimpanzee, consisting simply of a few sticks and leafy branches, supported by the crotches and limbs of trees: they afford no shelter, and are occupied only at night.

"They are exceedingly ferocious, and always offensive in their habits, never running from man, as does the Chimpanzee. They are objects of terror to the natives, and are never encountered by them except on the defensive. A few that have been captured were killed by elephant hunters and native traders, as they came suddenly upon them while passing through the forests.

"It is said that when the male is first seen he gives a terrific yell, that resounds far and wide through the forest, something like kh—ah! kh—ah! prolonged and shrill. His enormous jaws are widely opened at each expiration, his under lip hangs over the chin, and the hairy ridge and scalp are contracted upon the brow, presenting an aspect of indescribable ferocity.

"The females and young, at the first cry, quickly disappear. He then approaches the enemy in great fury, pouring out his horrid cries in quick succession. The hunter awaits his approach with his gun extended; if his aim is not sure, he permits the animal to grasp the barrel, and as he carries it to his mouth (which is his habit) he fires. Should the gun fail to go off, the barrel (that of the ordinary musket, which is thin) is crushed between his teeth, and the encounter soon proves fatal to the hunter. . . ."

One specimen Mr. Ford examined weighed 170 lbs., without the thoracic, or pelvic, viscera, and measured four feet four inches round the chest. This writer describes so minutely and graphically the onslaught of the Gorilla—though he does not for a moment pretend to have witnessed the scene—that I am tempted to give this part of his paper in full, for comparison with other narratives:

"He always rises to his feet when making an attack, though he approaches his antagonist in a stooping posture.

"Though he never lies in wait, yet, when he hears, sees, or scents a man, he immediately utters his characteristic cry, prepares for an attack, and always acts on the offensive. The cry he utters resembles a grunt more than a growl, and is similar to the cry of the Chimpanzee, when irritated, but vastly louder. It is said to be audible at a great distance. His preparation consists in attending the females and young ones, by whom he is usually accompanied, to a little distance. He, however, soon returns, with his crest erect and projecting forward, his nostrils dilated, and his under-lip thrown down, at the same time uttering his characteristic yell, designed, it would seem, to terrify his antagonist. Instantly, unless he is disabled by a well-directed shot, he makes an onset, and, striking his antagonist with the palm of his hands, or seizing him with a grasp from which there is no escape, he dashes him upon the ground, and lacerates him with his tusks.

"He is said to seize a musket, and instantly crush the barrel between his teeth This animal's savage nature is very well shown by the implacable desperation of a young one that was brought here. It was taken very young, and kept four months, and many means were used to tame it; but it was incorrigible, so that it bit me an hour before it died."

9. THE MOST ANCIENT SKELETAL REMAINS OF MAN¹

By A. HRDLÍČKA

INTRODUCTION

The early history of the human race, though merged in the darkness of ages, is step by step being traced and reconstructed; and apparently the time is drawing near when science will be able to announce, in the main at least, the definite solution of the profound and involved problem of man's origin, when, in other words, it will be in a position to show, however imperfectly, when, where, and how man ascended from the lower orders.

Actual research into the antiquity of mankind began considerably less than a century ago, and the more intensive investigations in this field cover hardly a generation. Such investigations have been fraught with many difficulties and are growing in complexity. They demand patient watchfulness, diligent and long-extended exploration, and considerable expense. The most careful attention must in every case be given to geological and paleontological evidence. And, after all, the net results of a prolonged quest may be no more than a few stone chips and implements, or perhaps a tooth, or a few badly crushed bones, belonging to human antiquity. But, as there are many hands at work, invaluable materials are accumulating. Besides this every now and then the search is more richly rewarded, or some important specimen is discovered accidentally; and every new, well-authenticated addition to the remains of early man or his predecessors, more particularly if it is a part of the skeleton, means a fresh, highly valuable document which throws supplementary light on the natural history of the human being. . . .

Europe, particularly in its more western and southern portions, has thus far proved the richest in ancient human remains. Africa, Asia, and those parts of Oceanica which were formerly connected with the Asiatic continent have as yet been but little explored. The island of Java, however, which is within the last named region, has furnished an intensely interesting specimen bearing on man's evolution and antiquity. As to America, the researches have thus far yielded nothing that could possibly be accepted as representing man of geological antiquity. For the present, therefore, an account of the very ancient remains of man, with the exception of the Java specimen, must be limited to early European forms. . . .

¹From *Smithsonian Report for 1913*, pages 491-552, Washington, 1914. The illustrations in the original have been renumbered and in some cases simplified.

PITHECANTHROPUS ERECTUS

In 1891-92 Dr. E. Dubois, then a surgeon in the Dutch army, while engaged in paleontological excavations along the left bank of the Bengawan River, near Trinil, in the central part of the Island of Java, discovered several skeletal parts of a primate evidently higher in scale and nearer to man than any before known.

The remains were thoroughly petrified and comprised, in all, the vault of a skull, two molar teeth, and a femur.

The bones were not found simultaneously nor in the same place. They lay some distances apart, though at the same horizon and embedded in the same stratum of volcanic matrix. This stratum was rich in fossil remains of various organic forms and, in the locality where the excavations were carried on, was about 1 meter below the dry-season water level, or 12 to 15 meters below the plain in which the river had cut its bed.

In September, 1891, the excavations in the volcanic matrix yielded unexpectedly, among other fossils, a remarkable tooth, a molar, which was determined as having belonged to a large unknown primate. A month later the unique and most interesting skull cap was discovered, only 1 meter distant from the place where lay the tooth. It now became certain that traces had come to light of a hitherto unknown primate of large size, standing in many respects nearer to man than any of the actual anthropoid apes. It was seemingly an intermediate form between the apes and man, and was characterized by the name of "*Pithecanthropus*."

Then came the rainy season and work had to be suspended. Exploration was recommenced, however, as early as possible in 1892, and in August of that year the femur was found about 15 meters (50 feet) from the locality where the other specimens had been embedded. Finally, in October of the same year, the second molar was secured, at a distance of not more than 3 meters (13) feet from the original position of the skull cap, and in the direction of the resting place of the femur.

The accompanying illustration (fig. 1) shows the locality of the discovery and the approximate positions of the specimens.

All four specimens were considerably mineralized, being of chocolate-brown color, very heavy, and "harder than marble." Numerous bones of mammals found in the same bed belonged to species now extinct or, so far as known, not now living in Java, and showed fossilization similar to that of the bones of the *Pithecanthropus*. The contours of the teeth and the femur were sharp, indicating that it has not been washed or rolled about to any great extent; but the skull cap showed the effects of erosion, probably caused by acidulous water seeping through the deposits.

All indications and a detailed study of the specimens led Dubois to the conclusions that: (1) The four skeletal pieces in question were contemporaneous; (2) they were of the age of the stratum in which found; (3) they be-

longed to one skeleton; and (4) they represent a transitional form of beings between the anthropoid apes and man, belonging to the direct line in the genealogy of the latter. . . .

While Dubois and other scientific men regard the *Pithecanthropus* remains as all belonging to the same skeleton, as dating chronologically from the latest part of the Tertiary or the earliest phase of the Quaternary period, and as

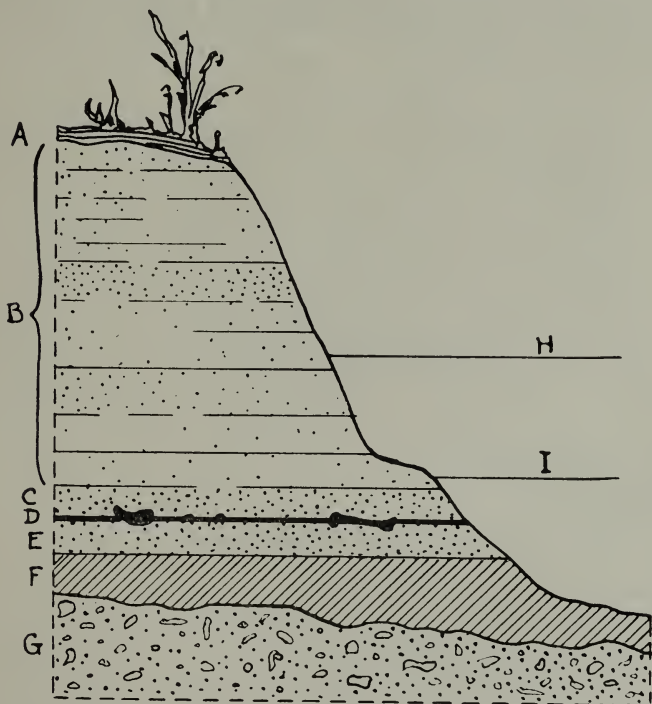


Fig. 1. Section of the strata where the *Pithecanthropus* bones were discovered. B, soft sandstone; D, level at which the skeletal remains were found; F, argillaceous layer; G, marine breccia; H, wet-season level of the river; I, dry-season level of the river.

representing a true intermediary form between the anthropoid apes and man, others have expressed doubts as to whether the four bones belong to the same form; or they consider the age of the remains, though no doubt early Quaternary, to be less than that estimated by Dubois. . . .

The skull cap (fig. 2) measures in greatest length 18.5 cm., in greatest (parietal) breadth 13 cm., and at the minimum of the frontal constriction

8.7 cm. It is dolichocephalic, its outline as seen from above is oblongly ovoid, narrowing considerably forward, and it is very low. It presents excessively prominent though not massive supraorbital arch and a very sloping front. The frontal bone, in addition, shows externally and along its middle a well-defined ridge, running from a short distance above the glabella toward bregma, and a marked low protuberance just forward of the bregma. The sagittal region is relatively flat and smooth and the occiput presents a dull transverse crest, connecting as in apes, though in much less pronounced manner, with the supramastoid crest on each side.



Fig. 2. *Pithecanthropus erectus* skullcap, from left side.

Without going into a detailed discussion of these characteristics, it will suffice to say that in most respects the specimen differs more or less from the ordinary human skull of to-day as well as from those of early man, so far as known, and approaches correspondingly the crania of the anthropoid apes. . . .

The walls of the skull are of only moderate thickness. Its internal capacity was originally believed by Dubois to have been quite large, namely about 1,000 c.c., but eventually he reduced this estimate to 900 c.c. or a little over. The capacity of an average cranium of a white American would amount in the male to about 1,500, in the female to about 1,350 c.c., while in the largest living anthropoid apes it only rarely attains or exceeds 600 c.c.

The impression which a comprehensive study of the whole skull cap carries to the observer is, that it represents a hitherto unknown primate form, which, whatever it may eventually be identified with and whether or not man's direct ancestor, stands morphologically between man and the known anthropoid apes, fills an important space in the hitherto existing large void between the two, and constitutes a precious document for the natural history of man.

Dubois's theoretical restoration of the whole cranium of the *Pithecanthropus*, which in all probability comes fairly near to the reality, is shown in figure 3. . . .

On the whole, it seems evident that the two teeth represent a higher primate form; in all probability they come from one individual, and their morphological characteristics are such that they may well have belonged to the

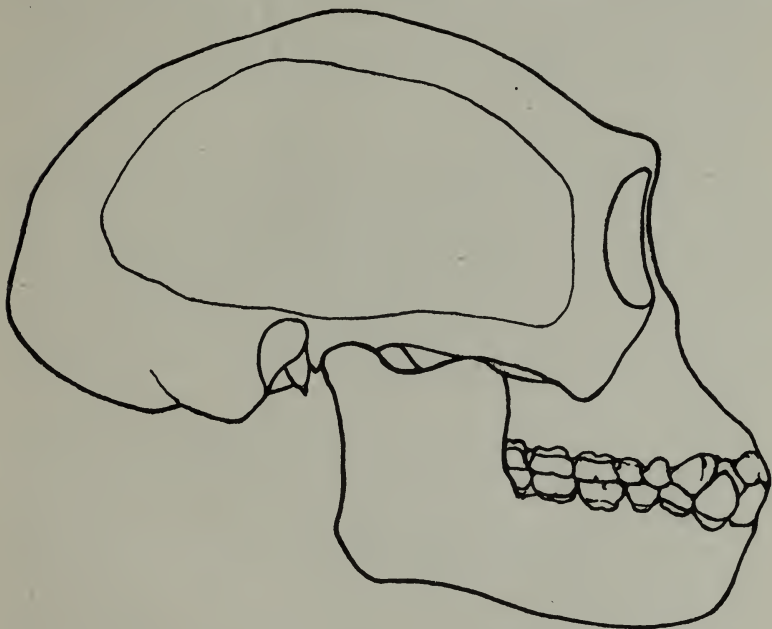


Fig. 3. Restoration of the skull of *Pithecanthropus* (After Dubois).

same species or even the same individual as the before-described skullcap. Their size, as seen from a comparison with the teeth of larger existing anthropoid apes, is not incompatible with the size of the skullcap, and that even if the latter belonged to a female individual.

The Trinil femur, according to Dubois, Manouvrier, and others, bears a close resemblance to the human thigh bone, both in size and shape; nevertheless it presents also some important differences. Its length, 45.5 cm., equals that of a human femur from a man 1.70 meters (5 feet, 7 inches) in stature, and of proportionate strength. . . .

The femur plainly belonged to a strong being maintaining erect or near-erect posture and marching mostly or entirely biped, as man. . . .

HOMO HEIDELBERGENSIS

One of the oldest thoroughly authenticated skeletal relics so far discovered and attributable to a primitive human being, is the priceless specimen known as the Mauer jaw. This precious document of man's evolution is deposited in the Paleontological Institute of Heidelberg. For its preservation and thorough description we are indebted to Dr. Otto Schoetensack, professor of Anthropology at Heidelberg University, who for years had been watching the finds in the sand pits near Mauer which eventually yielded the specimen. . . .

The deposits in which the specimen was discovered are located near the village of Mauer, which lies in the picturesque Elsenz Valley, 6 miles southeast from Heidelberg. . . .

The portion of these deposits owned by H. Rösch, located about 500 paces north of the Mauer village, have now been worked, in open manner, for upward of 30 years, in which time great quantities of building sand have been removed. During this work, particularly in the lower strata, the workingmen often unearthed fossil shells and fossil bones of various Quaternary animals. Many of these specimens found their way, mostly as gifts of Herr Rösch, to the Heidelberg University, and the diggings were repeatedly visited by scientific men, among whom Prof. Schoetensack. Both the owner and the workmen were enjoined to watch for better preserved specimens, and particularly for anything relating to the presence of man.

On the date of the find, two of the laborers were working in undisturbed material at the base of the exposure, over 80 feet in depth from the surface, when one of them suddenly brought out on his shovel part of a massive lower jaw which the implement had struck and cut in two. As the men knew it was worth while to carefully preserve all fossils, the specimen was handled with some care. The missing half was dug out, but the crowns of four of the teeth broken by the shovel were not recovered. The men were struck at once with the remarkable resemblance of the bone to a human lower jaw; but it looked to them too thick and large to be that of a man. They called Herr Rösch and he also was bewildered; but he recognized immediately that the specimen might be of considerable interest to Prof. Schoetensack and so he took charge of it. Returning to the village he telegraphed to the professor, who came the next day, and "once he got hold of the specimen, he would no more let it out of his possession." He took it to Heidelberg, cleaned it, repaired it, and in 1908 published its description in an exemplary way. Since then the valuable specimen has been preserved in the Paleontological Institute of the Heidelberg University, where, thanks to the liberality of those in charge, it is available for examination to men of science.

Shortly following the discovery of the jaw a most careful examination and study were made of the Mauer deposits. They were found to range from recent accumulations on the surface to Tertiary deposits in the lowest layers. The jaw lay a little less than three feet above the floor of the excavation and

79 feet from the surface. The same level, as well as some of the higher layers, yielded fossil bones of the *Elephas antiquus*, *Rhinoceros etruscus*, *Felis leo fossilis*, and various other extinct species. The age of the human jaw has been determined by these and subsequent exploration to be earlier Quaternary, though there seems to be some uncertainty as yet as to the exact subdivision of the period to which it should be attributed.

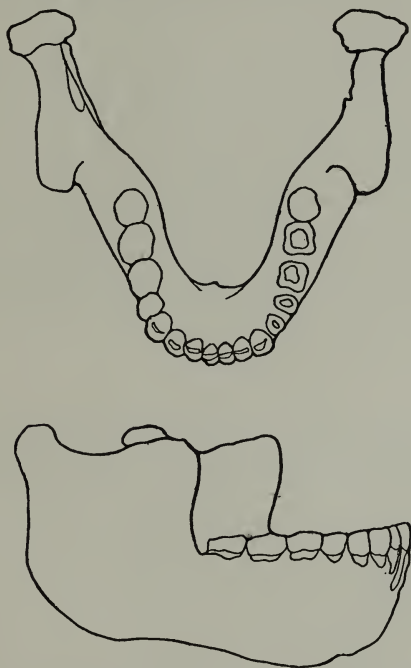


Fig. 4. The Mauer lower jaw. (After Schoetensack).

The original specimen, when seen, impresses one at once and potently as one of the greatest anthropological treasures. It is a huge lower jaw, which looks simultaneously both human and ape (fig. 4).

It presents no abnormality or any diseased condition that could have altered it in shape, so that it may well be regarded as a perfect representative of its type. The bone is dull yellowish-white to reddish in color, with numerous small and large blackish spots. The crowns of the teeth are dirty creamy white, with blackish discolorations on the somewhat worn-off chewing surfaces of the canines and incisors, and a few similar spots over the molars;

while all the parts of the teeth beneath the enamel are dull red, as if especially colored. It is much mineralized and feels more like so much limestone than bone. It weighs nearly 7 ounces.

The jaw is considerably larger and stouter than any other known human mandible. Its ascending rami are exceedingly broad. Its coronoid processes, thin and sharp in modern man, are thick, dull, broad, and markedly diverging. The chin slopes backward as in no human being now known or thus far discovered, with the possible exception of the recently reported *Eoanthropus*; and there are other primitive features. The total of the characteristics of the bone are such that, had the teeth been lost, it would surely have been regarded as the mandible of some large ape rather than that of any human being.

The teeth of the Mauer jaw, however, are perfectly preserved, and though large and provided with great roots and in various other ways primitive, they are unquestionably human teeth. They force the conclusion that their possessor, while of heavy, protruding face, huge muscles of mastication, wide and thick zygomatic arches, thick skull, probably heavy brows, and possibly not yet quite erect posture, had nevertheless already stepped over that line above which the being could be termed human. His food and probably his mode of life were related to those of primitive man, and he was already far removed from his primate ancestors with large canines. . . .

THE "EOANTHROPUS DAWSONI"²

A somewhat problematical as yet but deeply interesting find of ancient human skeletal remains has recently come to light in England. The specimen representing this discovery is an imperfect cranium, with a part of the lower jaw and a canine tooth. It is known as the Sussex or Piltdown skull, or more technically as the *Eoanthropus Dawsoni*, and its preservation is due to Mr. Charles Dawson. It is deposited in the British Museum of Natural History at Kensington and was first reported, with the circumstances of the find, on December 18, 1912, before the London Geological Society.

The history of this specimen, as given by Mr. Dawson, illustrates the usefulness and need, especially in the Old World, of scientific supervision of excavations. Mr. Dawson's statement is as follows:

Several years ago I was walking along a farm road close to Piltdown Common, Fletching (Sussex), when I noticed that the road had been mended with some peculiar brown flints not usual in the district. On inquiry I was astonished to learn that they were dug from a gravel bed on the farm, and shortly afterwards I visited the place, where two laborers were at work digging the gravel for small repairs to the roads. As this excavation was situated about four miles north of the limit where the occurrence of flints overlying the Wealden strata is recorded I was much interested and make a close examination

²The author's account of *Eoanthropus* comes before that of Heidelberg man, but the place of the two sections is here interchanged to conform with the usual opinion of the age and developmental priority of the forms.

of the bed. I asked the workmen if they had found bones or other fossils there. As they did not appear to have noticed anything of the sort I urged them to preserve anything that they might find. Upon one of my subsequent visits to the pit, one of the men handed to me a small portion of an unusually thick human parietal bone. I immediately made a search, but could find nothing more nor had the men noticed anything else. The bed is full of tabular pieces of ironstone closely resembling this piece of skull in color and thickness; and, although I made many subsequent searches, I could not hear of any further find nor discover anything—in fact, the bed seemed to be quite unfossiliferous.

It was not until some years later, in the autumn of 1911, on a visit to the spot, that I picked up, among the rain-washed spoil heaps of the gravel pit, another and larger piece belonging to the frontal region of the same skull, including a portion of the left superciliary ridge. . . .

I took the bones to Dr. A. Smith Woodward at the British Museum (Natural History) for comparison and determination. He was immediately impressed with the importance of the discovery, and we decided to employ labor, and to make a systematic search among the spoil heaps and gravel as soon as the floods had abated, for the gravel pit is more or less under water during five or six months of the year. We accordingly gave up as much time as we could spare since last spring (1912) and completely turned over and sifted what spoil material remained; we also dug up and sifted such portions of the gravel as had been left undisturbed by the workmen. . . .

From the above Mr. Dawson believed himself justified in drawing the following conclusions:

It is clear that this stratified gravel at Piltdown is of Pleistocene age, but that it contains in its lowest stratum animal remains derived from some destroyed Pliocene deposit probably situated not far away and consisting of worn and broken fragments. These were mixed with fragments of early Pleistocene mammalia in a better state of preservation, and both forms were associated with the human skull and mandible, which show no more wear and tear than they might have received *in situ*. Associated with these animal remains are Eoliths, both in a rolled and an unrolled condition; the former are doubtless derived from the older drift, and the latter in their present form are of the age of the existing deposit. In the same bed, in only a very slightly higher stratum, occurred a flint implement, the workmanship of which resembles that of implements found at Chelles, and among the spoils heaps were found others of a similar, though perhaps earlier, stage.

From these facts it appears probable that the skull and mandible can not safely be described as being of earlier date than the first half of the Pleistocene (or Glacial) epoch. The individual probably lived during a warm cycle of that age. . . .

Of the brain case there are four pieces (reconstructed from nine fragments) sufficiently well preserved to exhibit the shape and natural relations of a larger part of the vault and to justify the reconstruction of some other features. These bones are particularly noteworthy for their thickness, which reached 20 mm. at the internal occipital protuberance and 10 mm. along the greater part of the fractured edges of the frontal and parietals. The average thickness of modern European skulls, except in the locality of the various ridges and sutures, varies between 4 and 6 mm. . . .

The reconstructed cranium (fig. 5) is evidently that of an adult, but not old, female. . . .

The left temporal bone, which is excellently preserved, is "typically human in every detail," and corresponds closely with the same bone in a comparatively modern human skull. The mastoid is rather small. .

The capacity of the brain-case can not, of course, be exactly determined; but measurements both by millet-seed and by water show that it must have

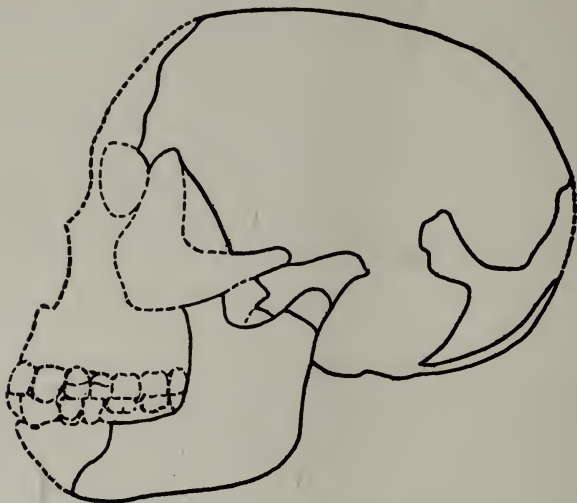


Fig. 5. First restoration of the skull and mandible of *Eoanthropus Dawsoni*. (After Dawson and Woodward.)

been at least 1,070 cc., while a consideration of the missing parts suggests that it may have been a little more. It therefore agrees closely with the capacity of the brain-case of the Gibraltar skull, as determined by Prof. Keith, and equals that of some of the lowest skulls of the existing Australians. It is much below that of the Mousterian skulls from Spy and La Chapelle-aux-Saints. . . .

As regards the lower jaw and the teeth it will be best to quote again from Dr. Woodward. According to this observer: "While the skull, indeed, is evidently human, only approaching a lower grade in certain characters of the brain in the attachment for the neck, the extent of the temporal muscles and in the probably large size of the face, the mandible appears to be almost precisely that of an ape, with nothing human except the molar teeth. . . ."

FOSSILS OF NEANDERTAL MAN

The Skull of Gibraltar

The history of the specimen is, regrettably, somewhat defective. The first mention of it occurs in Falconer's Paleontological Memoirs

Taking all the available data into consideration, it appears that the skull was discovered, accidentally, as early as 1848, therefore eight years before the Neandertal cranium made its appearance, in the "Forbes Quarry, situated on the north front of the Rock of Gibraltar." . . .

The skull was presented to the Gibraltar Scientific Society by its that time secretary, Lieut. Flint, but for many years received no scientific attention.

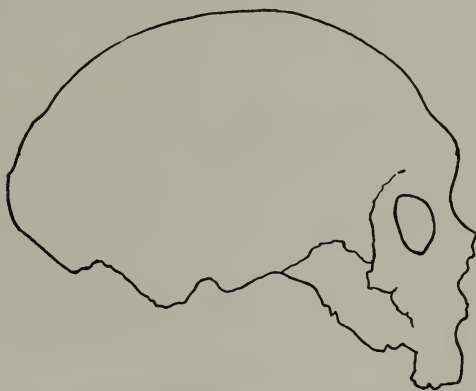


Fig. 6. The Gibraltar Skull.

In 1862 it came to England, with the collections from the Gibraltar caves, and was studied to some extent by Busk and Falconer. The latter, perceiving how much it differed from recent human skulls, proposed to refer it to a distinct variety of man, the *Homo colpicus*, after Calfé, the old name of Gibraltar. In 1868 finally Busk presented the cranium to the Museum of the Royal College of Surgeons of England, where it is still preserved.

The first descriptive account of the specimen was published, as mentioned above, by Broca, but the adhering stony matrix prevented at that time any attempts at accurate measurements. Subsequently it received attention from Huxley, Quatrefages, and Hamy, and later from Macnamara, Klaatsch, Schwalbe, Sollas, Sera, and Keith, as well as the writer. It is a very remarkable specimen which, even though the geological and paleontological evidence relating to its antiquity is imperfect, does not allow for one moment any doubt as to its representing an early form of the human being; and its characteristics are such that it is now universally regarded as a representative, possibly a very early one, of the *Homo neandertalensis*.

The cranium (fig. 6) is dirty yellowish to whitish in color. It is considerably mineralized. The stony matrix has been so far removed that all important determinations and measurements which the defective state of the bone itself permits, can now be made. A fortunate circumstance is that the frontal and facial parts are relatively well preserved; the vault on the other hand is largely defective, but even here sufficient portions remain to permit of a number of valuable determinations, and a fairly correct reconstruction . . .

The vault, viewed from above, is ovoid in shape and decidedly low. The forehead is low and sloping. The cranial bones are thick, exceeding any in this line that can be found in normal modern European.

The external dimensions of the skull are fairly large, but the brain was small. The cranial capacity is estimated by Keith as having been under 1,100 c.c.—that in an adult white woman of the present time averaging about 1,325 c.c.

The Neandertal Skull and Bones

The most famous of the skeletal remains representing early man are unquestionably the imperfect but highly characteristic specimens known as the Neandertal skull and bones. This important find more than any other has aroused scientific men to intense realization of the earlier phases of human evolution. The skull and to some extent also the other parts of the skeleton stand morphologically far below those of any existing type of man, being correspondingly nearer to the ancient primates; and their name has been deservedly taken to designate the entire early phase of mankind of which the skeleton is, as now well known, a prototype.

The skull, with other parts of the skeleton, were found in August, 1856. They were dug out accidentally by two laborers from a small cave, located at the entrance of the Neandertal gorge, in Westphalia, western Germany. The bones were given but little attention by the workmen, but fortunately news of the find reached an Elberfeld physician, Dr. Fuhlrott, and he was still able to save the skull-cap (fig. 7), the femora, humeri, ulnæ, right radius, portion of the left pelvic bone, portion of the right scapula, piece of the right clavicle, and five pieces of ribs. . . .

The principal details of Dr. Fuhlrott's report were as follows:

A small cave or grotto, high enough to admit a man and about 15 feet deep from the entrance, which is 7 or 8 feet wide, exists in the southern wall of the gorge of the Neandertal, as it is termed, at a distance of about 100 feet from the Dussel and about 60 feet above the bottom of the valley (fig. 8). In its earlier and uninjured condition this cavern opened upon a narrow plateau lying in front of it and from which the rocky wall descended almost perpendicularly to the river. It could be reached, though with difficulty, from above. The uneven floor was covered to a thickness of 4 or 5 feet with a deposit of mud, sparingly intermixed with rounded fragments of chert. In the removing of this deposit the bones were discovered. The skull was first noticed, placed nearest to the entrance of the cavern; and further in were the other bones

lying in the same horizontal plane. Of this I was assured in the most positive terms by two laborers who were employed to clear out the grotto, and who were questioned by me on the spot. At first no idea was entertained of the bones being human; and it was not till several weeks after their discovery that they were recognized as such by me and placed in security. But, as the importance of the discovery was not at the time perceived, the laborers were very careless in the collecting and secured chiefly only the larger bones; and to this circumstance it may be attributed that fragments merely of the probably perfect skeleton came into my possession. . . .



Fig. 7. The Neandertal skull.

Following the early notices concerning the Neandertal cranium, and before other specimens of similar nature, such as the Spy, Gibraltar and others became known, an extensive controversy arose as to the real significance of the find. Virchow, and after him others, were at first inclined to look upon the skull as pathological; to Barnard Davis its sutures appeared to show premature synostosis; while Blake and his followers regarded the specimen as probably proceeding from an idiot. But there were also those, such as Schaaffhausen, Broca, and others, who from the beginning saw in the cranium (the other bones received at first but little attention) not any pathological or accidental monstrosity, but a peculiar, thereto unknown type of ancient humanity. Then gradually new examples of this same early type appeared in different parts of Europe, under circumstances which steadily strengthened the claim of the whole class to geological antiquity; and when eventually a thorough comparative study of the Neandertal remains was carried out by modern methods and in view of new knowledge, the cranium and bones were definitely recognized as representing, in a normal and most characteristic way, a most interesting earlier phase or variety of mankind, our mid-quaternary predecessor or close relative *Homo neanderthalensis*. The credit for deserving work in this field is due especially to Prof. G. Schwalbe, of Strassburg, whose numerous publications on the early forms of human remains in Europe are well known to every anthropologist. . . .

The skull is gray in color, with large mud-brownish patches on the outside, and whitish gray to whitish brown on the inside. It is decidedly heavy and mineralized. It is plainly non-pathological. . . .

The facial and basal parts are lacking. The vault shows very good dimensions in length and breadth, but is strikingly low, and the bones are considerably thicker than in the white man of to-day, so that the brain cavity was only moderate.

Besides its lowness the vault is characterized by a very decided protrusion of the whole supra-orbital region. The supra-orbital fore-structure or arch formed through this protrusion is heavier than in any other known example of the *Homo neandertalensis*. . . .

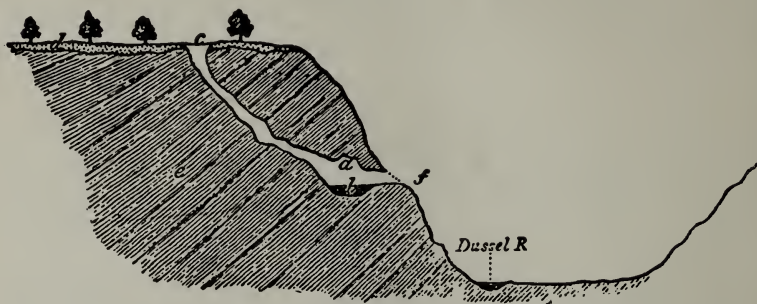


Fig. 8. Section of the Neandertal Cave, near Düsseldorf. (After Lyell.)

- a. Cavern 60 feet above the Düssel, and 100 feet below the surface of the country at c.
- b. Loam covering the floor of the cave, near the bottom of which the human skeleton was found.

The forehead is very low and also slopes markedly backward, nevertheless it presents a moderately well-defined convexity. . . . The thickness of the frontal bone at the eminences is 8.5 mm.; of the left parietal, along and 1 cm. above the squamous suture, 6 to 8 mm.; these measurements are about one-third greater than those of the skull of an average modern European. . . .

The internal capacity of the skull has been estimated by Schaaffhausen at 1,033 c.c., by Huxley at 1,230 c.c., and by Schwalbe at 1,234 c.c.

The brain which filled the skull was lower and narrower and slightly more pointed than the human brain of to-day, approaching in these features more the anthropoid form. The right frontal lobe was slightly larger and longer than the left, and the whole right hemisphere was slightly longer than that of the opposite side. In the present man it is generally the left hemisphere which is the longer, but this exception in the Neanderthal man is not necessarily of any special significance.

The long and other bones of the skeleton, so far as preserved, show many features of anthropological inferiority, demonstrating plainly that not merely the skull, but the whole body of the Neanderthal man occupied a lower evolutionary stage than that of any normal human being of the historic times. However, many of the details on these points are technical and must be reserved for another publication. The bones in general indicate a powerful musculature. They belong doubtless to a male individual. The stature of the man was about like the average of the present man in central Europe, or but slightly lower (the femora indicate, according to Manouvrier's scale, approximately 165 cm.). . . .

A careful examination and comparison of the Neanderthal skull and bones can leave only one impression on the anatomist or anthropologist of to-day, which is that while individually and jointly the various parts represent a human being already far advanced above any anthropoid, they are still in many respects decidedly more primitive in form—that is, on a lower scale of evolution—than the skull and bones of any man of to-day.

The remains are unquestionably the most precious representatives of the important phase of early humanity which we now include under the name of *Homo neandertalensis*.

The Spy Skeletons

In June of 1886 Messrs. Marcel de Puydt, member of the Archaeological Institute of Liege, and Maximin Lohest, at that time assistant of geology of the University of Liege, discovered in the terrace fronting a certain cave at Spy, in the Province of Namur, Belgium, the remains of two human skeletons associated with the debris of extinct Quaternary animals. The discovery was immediately brought to the attention of Prof. J. Fraipont, of the Liege University, and on the 16th of August, 1886, he announced the important find to the Congrès archéologique of Namur. . . .

The human bones lay in the lowest parts of the deposits, one 6, the other 8 meters in front of the entrance to the cave. They represented two individuals. One of these lay on its side, the hand touching the lower jaw; in the case of the other the original position could not be determined.

The terrace containing the Spy skeletons was situated 47.5 feet above the shallow bed of the stream running at the foot of the mountain, and the bones lay at the depth of 13 feet from the surface. The accumulations which formed the terrace included calcareous debris, various archaeological traces of man's presence, and numerous remains of fossil animals. They could be separated into several strata, none of which showed any perceptible disturbance.

The layer in which the human skeletons were inclosed yielded also bones of the following fossil Quaternary mammals: *Rhinoceros tichorhinus* (abundant); *Equus caballus* (very abundant); *Cervus elaphus* (rare); *Cervus tarandus* (very rare); *Bos primigenius* (fairly abundant); *Elephas primigenius* (common); *Ursus spelæus* (rare); *Meles Taxus* (rare); *Hyæna spelæa* (abundant).

This layer further contained a sliver of an animal bone which showed a crude adaptation for use, and worked stones of inferior workmanship, referable to the Mousterian period. The layer immediately above, undoubtedly of lesser age, gave besides the bones of similar fossil animals also those of a few living species, several thousands worked flints, some of which still of the Mousterian type, many worked bones including arrow points, and also fragments of pottery.

Considering the animal and archaeological remains associated with the human skeletons, together with the absence of disturbance in the superimposed more recent layers, Lohest believed himself justified to refer the Spy remains to the Mousterian period; and the deductions of Fraipont, based on the study of the skeletal remains themselves, were that they belonged to the Neandertal man. Since then the Spy remains have received careful consideration by every student of early man and the above classification was found to need no radical revision. . . .

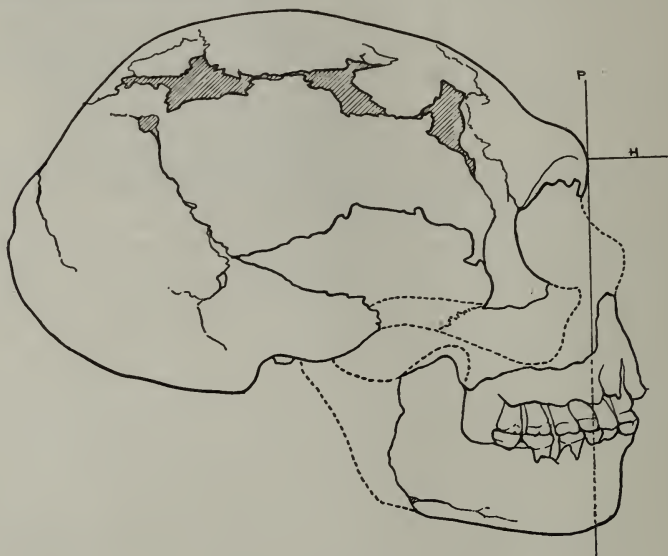


Fig. 9. Spy skull No. 1.

The bones of skeleton No. 1 are in general weaker than those of No. 2, but whether this is due to sexual difference of the two individuals, or is merely accidental, is difficult to determine. No. 2 was of a decidedly powerful musculature. The stature of the Spy man, so far as it can be determined from these remaining bones, was slightly less than that of the Neandertal man and somewhat below the medium of white man of central Europe of the present day. . . .

The two skulls are plainly normal specimens, free from disease or deformation, and belonged to adults, approaching in No. 1 middle age, while No. 2 was younger. . . .

No. 1 is almost a replica of the Neandertal cranium. There is a similarly prominent, though not quite as heavy, supra-orbital arch; the forehead is even a trace lower and a trace more sloping than in the Neandertal skull, and the general shape of the vault is much the same. The vault is also very low, but the sagittal region shows a slightly more perceptible elevation than that in the Neandertal specimen.

Skull No. 2 on the other hand, while possessing similar prominent supra-orbital arch as No. 1, has a considerably higher and more convex forehead, the whole vault is higher as well as more spacious, and the form approaches in many respects that in modern man. The brain cavity in No. 1 is anteriorly low and relatively narrower, as well as somewhat more pointed, than in recent human crania; in No. 2 these features are also more like those in the present man. On the whole it may be said that No. 2, while in some respects still very primitive, represents morphologically a decided step from the Neanderthaloid to the present-day type of the human cranium.

The lower jaw of No. 1, while yet of a primitive form, possesses nevertheless already a trace of the chin prominence, and in size and anatomical characteristics is closer to the present-day form than any of the other known lower jaws dating from the Mousterian period; and the same is true of the teeth which, though considerably worn, were evidently much like human teeth of to-day. . . .

The remaining bones of the Spy skeletons show various anatomical peculiarities and secondary primitive features, but these call for a technical description and comparisons. A rather unexpected condition, found since in other skeletons of *Homo neandertalensis*, is the relative shortness of the forearms, as well as the legs. . . .

The Diluvial Man of Krapina

One of the most important finds relating to the *Homo neandertalensis* is unquestionably that of the Krapina cave, in northern Croatia. It comprises a whole series of human bones of well-determined age, and the remains were not recovered accidentally or by ignorant laborers, but through prolonged, painstaking exploration. The bones themselves are for the most part fragmentary, which is much to be regretted, but they represent numerous individuals, and they show on one hand such similarities and on the other such variation of structure, that they are of the greatest value to the student of ancient humanity. . . .

The locality became known in 1895, after two Croatian teachers discovered in the superficial deposits of the cave some teeth of rhinoceros and fragments

of other fossil bones. These finds were brought to the attention of some of the scientific men at Zagreb (Agram), but no thorough examination of the site was undertaken until 1899. In that year the place was visited by Dr. K. Gorjanovič-Kramberger, professor of geology and paleontology in the University of Zagreb and the director of the geological division of the Narodni Muzej of Zagreb, Croatia; and on excavation it was soon found that the Krapina hollow was in all probability one of the stations of early man and as such deserved a thorough exploration. Such exploration was begun without delay and was carried on, with some interruptions, until 1905, when the contents of the shelter became exhausted. . . .

The collections consist of several thousands of various fossil animal bones, mostly fragmentary, but some well preserved; of hundreds of stone flakes the rejects of stone manufacture, and of stone implements; and of parts of human bones proceeding from at least 14 skeletons.

The animal bones represent either totally extinct forms or species now extinct in Croatia. The most common are those of *Rhinoceros Merckii*, *Ursus spelaeus*, and *Bos primigenius*. By these remains the age of the deposits has been determined as earlier Diluvial (i. e. *interglacial*), corresponding in all probability to the latter part of the Mousterian culture epoch in western Europe. The stone implements belong to the Mousterian and earlier types. . . .

The bones represent, as already mentioned, the remains of at least 14 individuals of both sexes, ranging from childhood to ripe adult age. The fragmentation of the skulls, lower jaws and some of the long bones is excessive, and of such a nature as to suggest that it was caused otherwise than by accidental breaking or crushing. A number of the fragments show also the effects of burning, and one specimen, a portion of the supra-orbital part of a frontal, presents some cuts. These different conditions, together with the absence of many parts of the skulls and bones, with total lack of association of the fragments and the commingling of the human with the animal bones, led Gorjanovič-Kramberger to the opinion that the remains represent the leavings of occasional cannibalistic feasts and are not burials. . . .

The long and other bones of the skeleton, relatively less interesting than the skulls and jaws, show the Krapina man to have been, as compared with central European white man of to-day, of moderate stature, and outside of the powerful jaws, of strong though not excessive muscular development. Some individuals were very perceptibly weaker than others. . . .

The fragments of the skulls show that the bones of the vault were considerably thicker than they are in the white man of to-day. The crania were of good size externally, but the brain cavities were probably below the present average. The vault of the skull was of good length and at the same time fairly broad, so that the cephalic index, at least in some of the individuals, was more elevated than usual in the crania of early man. They were also characterized, as the Neandertal and other crania of the man from the Mousterian epoch, by lowness of the vault, and in every instance among the adults by a pro-

nounced, complete supraorbital arc. The last-named feature, though less marked, is plainly distinguishable even in the children. Its invariable presence is a definite proof of the fact, not quite well established before, that this arc was up to a certain phase of the Quaternary period a regular characteristic of the early man of a large part of Europe. . . .

Taking everything into consideration, it is evident that the diluvial man of Krapina represents a group belonging to the family of the *Homo neanderthalensis*. . . .

The Fossil Man of La Chapelle-Aux-Saints

One of the most interesting, best authenticated, and thanks to Prof. Marcellin Boule, now best known skeletons of Early Man, is that of "the fossil man of La Chapelle-Aux-Saints."

La Chapelle-Aux-Saints is a small village in the Department of Corrèze, near the small railroad station of Vayrac and south of the town of Brive, in southern France. A little over 200 yards from the village and beyond the left bank of the small stream Sourdoire, in the side of a moderate elevation, is located a cave, now known as that of La Chapelle-Aux-Saints. In 1905 archeological exploration of this cave was undertaken by three Corrèze priests, the abbés A. and J. Bouyssonie and L. Bardon. These explorations which from the beginning were successful, resulting in the recovery of numerous industrial and other vestiges of paleolithic man, progressed gradually until the uniform archeological stratum was nearly exhausted, when, on the 3rd of August, 1908, the excavators came across a shallow artificial fossa in the floor of the cave in which lay the bones of a remarkable human skeleton. . . .

The various reports show that the cave of La Chapelle-Aux-Saints is a moderate-sized and rather low cavity, about 6 meters long, 2 to 4 meters broad, and 1 to 1.50 meters high. When first approached it was seen to be nearly filled with accumulations, which later disclosed numerous traces of man, and by débris of the rock from the roof and sides. The deposits bearing traces of the presence of man were found to proceed from but one age and one culture, namely the Mousterian. The objects of archeological interest recovered during the excavation comprise in the main worked stones of the well-known Mousterian types, and remains of bones of fossil animals, such as the reindeer, bison, *Rhinoceros tichorhinus*, etc. . . .

Under the accumulations the floor of the cavern was found to be whitish, hard, marly calcareous; and in this hard base, at the distance of a little over four meters from the entrance of the cave, was located the nearly rectangular, moderate-sized cavity which lodged the fossil human skeleton. The depression was clearly made by the primitive inhabitants or visitors of the cave for the body and the whole represents very plainly a regular burial, the most ancient intentional burial thus far discovered.

The body lay on its back, with the head to the westward, the latter being surrounded by stones. The left arm was extended, the right probably bent

so that the hand was applied to or lay near the head. The lower limbs were partly flexed. Above the head were found three or four large flat fragments of long bones of animals, and somewhat higher there lay, still in their natural relation, some foot bones of a large Bovid, suggesting that the whole foot of the animal may have been placed in that position. About the body were many flakes of quartz and flint, some fragments of ochre, broken animal bones, etc., much as in the rest of the archeological stratum above the skeleton. . . .



Fig. 10. La Chapelle-aux-Saints skull.

The La Chapelle skull (fig. 10), notwithstanding its many peculiarities, is plainly a normal specimen, not affected (except in the dental arches) by any disease or by any premature closure of sutures.

The skull is distinctly masculine, and proceeds from an adult of somewhat advanced age.

Its vault is remarkably like that of the Neandertal cranium, though somewhat larger. There is the same huge, prominent, complete supraorbital arch. The nasal process is equally broad and sloping considerably downward and backward. Due to the pronounced supraorbital arch the upper half of the orbits, as in the Neandertal skull, has a somewhat forward and downward inclination, wholly unlike that of any man of to-day. The forehead, while low, is somewhat better formed than in the Neandertal and Spy No. 1 crania and less sloping. . . .

The bones of the vault, again, as in the Neandertal and other crania of this type, are thicker than in the skulls of modern man; nevertheless the

capacity of the skull was quite large. Prof. Boule estimates it at from 1,600 to 1,620 c.c. This indicates not necessarily a superior brain, but rather one subserving to largely developed organs and powerful musculature. . . .

The lower jaw is large, stout, chinless—though not sloping backward at the symphysis, and otherwise primitive. It was doubtless high, but the

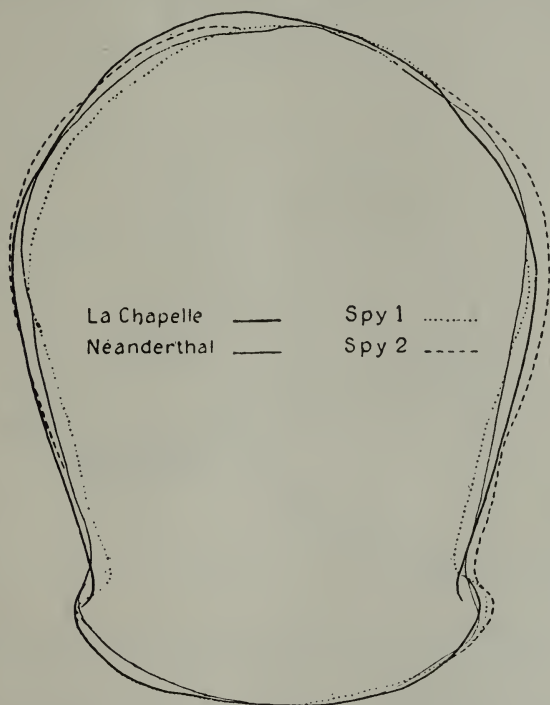


Fig. 11. Outline of four skulls of Neandertal man, seen from above.

reduction of the alveolar process through pyorrhoëa and absorption does not permit a definite appreciation of this character. . . .

The long and other bones of the skeleton are, on the whole, less remarkable than those of the Neandertal or Spy remains, but the peculiarities and primitive features which they possess are of much the same order. The stature of the Chapelle-aux-Saints man is estimated by Prof. Boule to have been about 1.611 meters (5 ft. 3 in.), which is close to that of the Neandertal man and the man of Spy. The bones are robust; the extremities of the long bones are large. The radii and ulnæ and especially the tibiæ and fibulæ, are

again, as in other skeletons of the Neandertal type, relatively short. There is also the pronounced curvature to the radius; and there are other peculiarities about the specimens an enumeration of which in this place is not feasible. Certain of these peculiarities indicate, according to Prof. Boule, that the individual from whom the Chapelle-aux-Saints skeletal remains proceed had, in common with others of the Neandertal type, not as yet reached a fully erect posture.



Fig. 12. Profiles of the cranium of a chimpanzee, the cranium of La Chapelle-aux-Saints, and that of a modern Frenchman superposed, and with a common basi-nasal line equal in length for each. (After Boule.)

The study of the brain of this individual, so far as possible from a cast of the cranial cavity, also shows various features of importance. Among the more strictly human characteristics are its large size, normally always a very favorable feature, though not necessarily an index of high intelligence; a predominance in size of the left over the right hemisphere; and certain other anatomical features. The more simian characteristics included especially the general form of the organ, the evident simplicity and coarseness of the convolutions, and the relatively poor development of the frontal parts, which is more pointed forward than obtains in man of to-day. "The brain, on the whole," to quote Prof. Boule, "is already human by the abundance of the cerebral substance; but this substance is still lacking the advanced organization which characterizes the brain of the actual man."...

The Moustier Man

Still another highly interesting and scientifically valuable skeleton of early man, recently discovered, is that of the so-called "*Homo mousteriensis* Hauseri." The skeleton is preserved in the Museum für Völkerkunde at Berlin, where it was seen by the writer. It was discovered in March 1908, by O. Hauser, during archaeological excavation in what is known as "the lower Moustier cave," or "paleolithic station number 44," at Le Moustier, in the valley of the Vézère, Department of Dordogne, France, and was eventually purchased from Herr Hauser for the Berlin Museum.

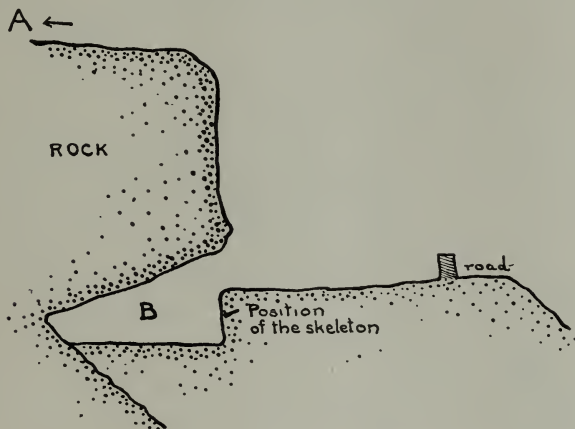


Fig. 13. The upper (A) and lower (B) Le Moustier caves and the position of the skeleton of *Homo mousteriensis*.

The cave in question (fig. 13), or more properly rock shelter, when excavated gave numerous evidences of man's occupation, but no human bones. The skeleton under consideration was discovered in the terrace in front of the cave, almost vertically below its entrance. It lay about 3 feet deep and no disturbance in the superimposed deposits was noticeable.

The human bones were uncovered with great care in the presence of responsible witnesses, then covered again with earth and left in situ for several months, though shown during this time to a number of visitors. In August they were exposed for Virchow, v. d. Steinen, Klaatsch, and other scientific men, and finally, two days afterwards, in the presence of Prof. Klaatsch, they were gathered from the deposits. . . .

The skeleton, it appears, lay on its side in a natural position, with the right hand under the occiput, the left extended along the body. About the body and among the bones were found seventy-four worked flints, ten of which were of a well-defined form. On the skull rested a charred bone of a *Bos primi-*

genius, and in the neighborhood of the thorax lay a tooth of the same animal. Besides this, 45 other fragments of animal bones were gathered in a close vicinity to the human remains.

The examination of the human bones was begun on the spot by Prof. Klaatsch, who eventually reached the following conclusions:

The skeleton belongs to an adolescent of perhaps 16 years of age and probably of the male sex. The height of the boy, as estimated from the long bones, was probably 1.45 to 1.50 meters (4 feet 9 inches to 4 feet 11 inches).

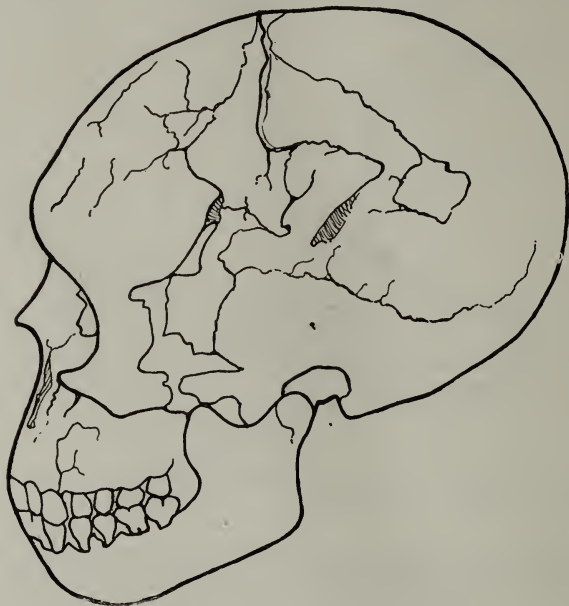


Fig. 14. Skull of *Homo Mousteriensis* Hauseri.

The skull (fig. 14), notwithstanding the youth of the subject, shows a number of characteristics which are peculiar to the Neandertal group. While of a good size, with only moderately thick bones of the vault and the latter of a fair height, it shows nevertheless a rather low and sloping forehead; a well-marked complete supraorbital arch or torus, which later in life would doubtless have become much more prominent; relatively large dental arches, with large and in a number of particulars primitive teeth; a massive lower jaw with complete absence of the chin eminence; and other interesting features: . . .

Klaatsch reached the deduction that the skeleton belongs undoubtedly to the *Homo neandertalensis* variety of the early European.

10. THE STONE AGE—PAST AND PRESENT¹

By E. B. TYLOR

The Stone Age is that period in the history of mankind during which stone is habitually used as a material for weapons and tools. Antiquaries find it convenient to make the Stone Age cease whenever metal implements come into common use, and the Bronze Age, or the Iron Age, supervenes. But the last traces of a Stone Age are hardly known to disappear anywhere, in spite of the general use of metals; and in studying this phase of the world's history for itself, it may be considered as still existing, not only among savages who have not fairly come to the use of iron, but even among civilized nations. Wherever the use of stone instruments, as they were used in the Stone Age proper, is to be found, there the Stone Age has not entirely passed away. The stone hammers with which tinkers might be found at work till lately in remote districts in Ireland, the huge stone mallets with wooden handles which are still used in Iceland for driving posts and other heavy hammering, and the lancets of obsidian with which the Indians of Mexico still bleed themselves, as their fathers used to do before the Spanish Conquest, are stone implements which have survived for centuries the general introduction of iron.

Mere natural stones, picked up and used without any artificial shaping at all, are implements of a very low order. Such natural tools are often found in use, for the most part slabs, water-worn pebbles, and other stones suited for hammers and anvils, and their employment is no necessary proof of a very low state of culture. Among the lower races, Dr. Milligan gives a good instance of their use, in describing the shellmounds left by the natives on the shores of Van Diemen's Land. In places where the shells found are univalves, round stones of different sizes are met with; one, the larger, on which they broke the shells; the other, and smaller, having served as the hammer to break them with. But where the refuse-mounds consist of oysters, mussels, cockles, and other bivalves, there flint-knives, used to open them with, are generally found. Sir George Grey's description of the sites of native encampments, so frequently met with in Australia, will serve as another example. The remains of such an encampment consist of a circle of large flat stones arranged round the place where the fire has been; on each of the flat stones a smaller stone for breaking shell-fish; besides each pair of stones a large shell used for a cup, and, scattered all around, broken shells and bones of kangaroos.

Nor are cases hard to find of the use of these very low representatives of the Stone Age carried up into higher levels of civilization. Thus the tribes

¹From pages 194–222 of E. B. Tylor, *Early History of Mankind*.

of Central and Southern Africa, though often skilful in smiths' work, have not come thoroughly to the use of the iron hammer and anvil. Travellers describe them as forging their weapons and tools with a stone of handy shape and size, on a lump of rock which serves as an anvil; while sometimes an iron hammer is used to give the last finish. The quantities of smooth rolled pebbles found in our ancient English hill-forts were probably collected for sling-stones; but larger pebbles, very likely used as cracking-stones, are found in early European graves. At the present day, the inhabitants of Heligoland and Rügen not only turn to account the natural net-sinkers formed by chalk-flints, out of which the remains of a sponge, or such thing, has been washed, leaving a convenient hole through the flint to tie it by; but they have been known to turn such a perforated flint into a hammer, by fixing a handle in the hole. And lastly, the women who shell almonds in the south of France still use a smooth water-worn pebble (*couède, couèdou*), as their implement for breaking the shells.

The distinction between natural and artificial implements is of no practical value in estimating the state of culture of a Stone Age tribe. A natural chip or fragment of stone may have been now and then used as an edged or pointed tool; but we have not the least knowledge of any tribe too low habitually to shape such instruments for themselves. There is, however, a well-marked line of distinction in the Stone Age which divides it into a lower and a higher section. We have no historical knowledge of any tribe who have used stone instruments, and have not been in the habit of grinding or polishing some of them. But there are remains which clearly prove the existence of such tribes, and thus the Stone Age falls into two divisions, the Unground Stone Age and the Ground Stone Age.

To the former and ruder of these two classes belong the instruments of the Drift or Quaternary deposits, and of the early bone caves, and, in great part at least, those of the Scandinavian shell heaps or *kjökkenmøddings*. Even should a few ground instruments prove to belong to these deposits, the case would not be much altered, for the finding of hundreds of unground implements unmixed with ground ones will still show a vast predominance of chipping over grinding, which would justify their being classed in an Unground Stone Age, quite distinct from the Ground Stone Age in which modern tribes have been found living.

The rude flint implements found in the drift gravels of the Quaternary (*i. e.* Post-Tertiary) series of strata, belong to the earliest known productions of human art. Since the long unappreciated labors of M. Boucher de Perthes showed the historical importance of these relics, the date of the first appearance of man on the earth has been much debated. . . .

A set of characteristic drift implements would consist of certain tapering instruments like huge lance-heads, shaped, edged, and pointed, by taking off a large number of facets, in a way which shows a good deal of skill and feeling for symmetry; smaller leaf-shaped instruments; flints partly shaped and

edged, but with one end left unwrought, evidently for holding in the hand; scrapers with curvilinear edges; rude flake-knives, etc. Taken as a whole, such a set of types would be very unlike, for instance, to a set of chipped instruments belonging to the comparatively late period of the cromlechs in France and England. But a comparison of particular types with what is found elsewhere, breaks down any imaginary line of severance between the men of the Drift and the rest of the human species. The flake knives are very rude, but they are like what are found elsewhere, and there is no break in the series which ends in the beautiful specimens from Mexico and Scandinavia. The Tasmanians sometimes used for cutting or notching wood a very rude instrument. Eye-witnesses describe how they would pick up a suitable flat stone, knock off chips from one side, partly or all round the edge, and use it without more ado; and there is a specimen corresponding exactly to this description in the Taunton Museum. An implement found in the Drift near Clermont would seem to be much like this. The drift tools with a chipped curvilinear edge at one end, which were probably used for dressing leather and other scraping, are a good deal like specimens from America. The leaf-shaped instruments of the Drift differ principally from those of the Scandinavian shell-heaps, and of America, in being made less neatly and by chipping off larger flakes; and there are leaf-shaped instruments which were used by the Mound-Builders of North America, perhaps for fixing as teeth in a war-club in Mexican fashion, which differ rather in finish than in shape from the Drift specimens. Even the most special type of the Drift, namely, the pointed tapering implement like a great spear-head, differs from some American implements only in being much rougher and heavier. There have been found in Asia stone implements resembling most closely the best marked of the Drift types. Mr. J. E. Taylor, British Consul at Basrah, obtained some years ago from the sun-dried brick mound of Abu Shahrein in Southern Babylonia, two taper-pointed instruments of chipped flint, which, to judge from a cast of one of them, would be passed without hesitation as Drift implements. . . .

Beside the want of grinding, the average quality of the instruments of the Unground Stone Age is very low, notwithstanding that its best specimens are far above the level of the worst of the later period. These combined characters of rudeness and the absence of grinding give the remains of the Unground Stone Age an extremely important bearing on the history of Civilization, from the way in which they bring together evidence of great rudeness and great antiquity. The antiquity of the Drift implements is, as has been said, proved by direct geological evidence. The cave implements, even of the reindeer period, are proved by their fauna to be earlier, as they are seen at a glance to be ruder, than those of the cromlech period, and of the earliest lake-dwellings of Switzerland, both belonging to the Ground Stone Age. To the student who views human Civilization as in the main an upward development, a more fit starting-point could scarcely be offered than this

wide and well marked progress from an earlier and lower, to a later and higher, stage of the history of human art.

To turn now to the productions of the higher or Ground Stone Age, grinding is found rather to supplement chipping than to supersede it. Implements are very commonly chipped into shape before they are ground, and unfinished articles of this kind are often found. Moreover, such things as flake-knives, and heads for spears and arrows, have seldom or never been ground in any period, early or late, for the obvious reason that the labor of grinding them would have been wasted, or worse. Flake-knives of obsidian appear to have been sometimes finished by grinding in Mexico, but most stone knives of the kind seem to have been used as they were flaked off. This question of grinding or not grinding stone implements is brought out clearly by some remarks of Captain Cook's, on his first voyage to the South Seas. He noticed that the natives of Tahiti used basalt to make their adzes of, and these it was necessary to sharpen almost every minute, for which purpose a stone and a cocoa-nut shell full of water were kept always at hand. When he saw the New Zealanders using, for the finishing of their nicest work, small tools of jasper, chipped off from a block in sharp angular pieces like a gunflint, and throwing them away as soon as they were blunted, he concluded they did not grind them afresh because they could not. This, however, was not the true reason, as their grinding jade and other hard stones clearly shows; but it was simply easier to make new ones than to grind the old. A good set of implements of the Ground Stone Age will consist partly of instruments made by mere chipping, such as varieties of spear-heads, arrow-heads, and flake-knives, and partly of ground implements, the principal classes of which are celts, axes, and hammers.

The word celt (Latin *cellis*, a chisel) is a convenient term for including the immense mass of instruments which have the simple shape of chisels, and might have been used as such. No doubt many or most of them were really for mounting on handles, and using as adzes or axes; but in the absence of a handle, or a place for one, or a mark where one has been, it is often impossible to set down any particular specimen as certainly a chisel, an axe, or an adze. When, however, the cutting edge is hollowed as in a gouge, it is no longer possible to use it as an axe, though it retains the other two possible uses of chisel and adze. The water-worn pebble, in which a natural edge has been made straighter and sharper by grinding, may be taken as the original and typical form of the celt. Rude South American tribes select suitable water-worn stones and rub down their edges, sometimes merely grasping them in the hand to use them, and sometimes mounting them in a wooden handle; and axes made in this way, by grinding the edge of a suitable pebble, and fixing it in a withe handle, are known in Australia. Moreover, the class to which this almost natural instrument belongs, that, namely, which has a double convex cross section, is far more numerous and universally distributed than the double-flat, concavo-convex, triangular, or other forms.

Where artificially shaped celts are found only chipped over, in high Stone Age deposits, as in Scandinavia, they are generally to be considered as unfinished; but when celts of hard stone are found only ground near the edge, and otherwise left rough from chipping, they may be taken as denoting a rude state of art. Thus flint celts ground only near the edge are found in Northern Europe, and even in Denmark; but in general celts of the hardest stone are found, during the Ground Stone Age, conscientiously ground and polished all over, and every large celt of hard stone which is finished to this degree represents weeks or months of labor, done not so much for any technical advantage, as for the sake of beauty and artistic completeness.

The primitive hammer, still used in some places, is an oval pebble, held in the hand. Above this comes the natural pebble, or the artificially shaped stone, which is grooved or notched to have a bent withe fastened round it as a handle, as our smiths mount heavy chisels. Above this again is the highest kind, the stone hammer with a hole through it for the handle. This is not found out of the Old World, perhaps not out of Europe; and even the Mexicans, who in many things rivalled or excelled the stone-workers of ancient Europe, do not seem to have got beyond grooving their hammers. The stone axe proper, as distinguished from the mere celt by its more complex shape, and by its being bored or otherwise fitted for a handle, is best represented in the highest European Stone Age, and in the transition to the Bronze Age. . . .

The Ethnographer who has studied the stone implements of Europe, Asia, North or South America, or Polynesia, may consider the specimens from the district he has studied, as types from which those of other districts differ, as a class, by the presence or absence of a few peculiar instruments, and individually in more or less important details of shape and finish, unless, as sometimes happens, they do not perceptibly differ at all. So great is this uniformity in the stone implements of different places and times, that it goes far to neutralize their value as distinctive of different races. It is clear that no great help in tracing the minute history of the growth and migration of tribes, is to be got from an arrowhead which might have come from Patagonia, or Siberia, or the Isle of Man, or from a celt which might be, for all its appearance shows, Mexican, Irish, or Tahitian. If an observer, tolerably acquainted with stone implements, had an unticketed collection placed before him, the largeness of the number of specimens which he would not confidently assign, by mere inspection, to their proper countries, would serve as a fair measure of their general uniformity. Even when aided by mineralogical knowledge, often a great help, he would have to leave a large fraction of the whole in an unclassified heap, confessing that he did not know within thousands of miles or thousands of years, where and when they were made. . . .

To turn to an easier branch of the subject, I have brought together here, as a contribution to the history of the Stone Age, a body of evidence which shows that it has prevailed in ancient or up to modern times, in every great district of the inhabited world. By the aid of this, it may be possible to

sketch at least some rude outline of the history of its gradual decline and fall, which followed on the introduction of metal in later periods, up to our own times, when the universal use of iron has left nothing of the ancient state of things, except a few remnants, of interest to ethnologists and antiquaries, but of no practical importance to the world at large.

In the first place, there are parts of the world whose inhabitants, when they were discovered in modern times by more advanced races, were found not possessed of metals, but using stone, shell, bone, split canes, and so forth, for purposes in making tools and weapons to which we apply metals. Now as we have no evidence that the inhabitants of Australia, the South Sea Islands, and a considerable part of North and South America, had ever been possessed of metals, it seems reasonable to consider these districts as countries where original Stone Age conditions had never been interfered with, until they came within the range of European discovery. . . .

If we now turn to the history of the Stone Age in Asia, Africa, and Europe, we shall indeed find almost everywhere evidence of a Stone Period, which preceded a Bronze or Iron period, but this is only to be had in small part from the direct inspection of races living without metal implements. The Kamchadals of north-eastern Asia, a race as yet ethnologically isolated, were found by the Kosak invaders using cutting-tools of stone and bone. It is recorded that with these instruments it took them three years to hollow out a canoe, and one year to scoop out one of the wooden troughs in which they cooked their food; but probably a large allowance for exaggeration must be made in this story. It is curious to notice that, thirty or forty years ago, Erman got in Kamchatka one of the Stone Age relics found in such enormous numbers in Mexico, a fluted prism of obsidian, off which a succession of stone blades had been flaked; but though one would have thought that the comparatively recent use of stone instruments in the country would have been still fresh in the memory of the people, the natives who dug it up had no idea what it was. Stone knives, moreover, have been found in the high north-east of Siberia, on the site of deserted yourts of modern date, said to have been occupied by the settled Chukchi, or Shalags.

Chinese literature has preserved various notices of the finding and use of stone implements. Such is a passage speaking of arrows with stone heads sent as tribute by the barbarians in the reign of Wu-Wang (about B. C. 1100), and two which mention the actual use of such arrows in China, whether by Chinese or Tatars, up to the 13th century of our era. Again, referring to Nan-hiu-fu, in the province of Kwan-tong, in Southern China, it is stated, "They find, in the mountains and among the rocks which surround it, a heavy stone, so hard that hatchets and other cutting instruments are made from it." It is to be remembered that China is not inhabited only by the race usually known to us as the Chinese, but by another, or several other far less cultured races; the mountains of Kwan-tong and the other southern provinces being especially inhabited by such rude and seemingly aboriginal tribes. There is,

besides, a Chinese tradition speaking of the use of stone for weapons among themselves in early times, which implies at least the knowledge that this is a state of things characterizing a race at a low stage of culture, and may really embody a recollection of their own early history. Fu-hi, they say, made weapons; these were of wood, those of Shin-nung were of stone, and Chi-yu made metal ones. . . .

Though history gives but partial means of proving the existence of a Stone Age over Asia and Europe, the finding of ancient stone tools and weapons, in almost every district of these two continents, proves that they were in former times inhabited by Stone Age races, though whether in any particular spot the tribes we first find living there are their descendants as well as their successors, this evidence cannot tell us. How, for instance, are we to tell what race made and used the obsidian flakes which were found with polished agate and carnelian beads under the chief corner-stone of the great temple of Khor-sabad? All through Western Asia, and north of the Himalaya, stone implements are scattered broadcast through the land; while China, to judge from the slender evidence forthcoming, seems to have had its Stone Age like other regions.

Japan abounds in Stone Age relics, of which Van Siebold has given drawings and descriptions in his great work, and his own collection at Leyden is very rich in specimens. . . .

In India an account of the discovery by Mr. H. P. Le Mesurier of a great number of ancient stone celts was published in 1861. He found them stored up in villages of the Jubbulpore district, near the Mahadeos, and in other sacred places; and since then many more have been met with by other observers. India has now to be reckoned among countries which afford relics not only of the Stone Age, but of its ruder period of unpolished implements, preceding the more advanced period of the ground celt. . . .

Before drawing any inference from these pieces of evidence, it will be well to bring together other accounts of the use of cutting instruments of stone, glass, etc., by people who, though in possession of iron knives, for some reason or other did not choose to apply them to certain purposes. Thus the practice of sacrificing a beast, not with a knife or an axe, but with a sharp stone, has been observed on the West Coast of Africa during the last century. . . .

An often quoted instance of the use of a stone knife for a ceremonial purpose, where iron would have been much more convenient, is the passage in Herodotus which relates that, in Egypt, the mummy-embalmers made the incision in the side of the corpse with a sharp Æthiopic stone. The account given by Diodorus Siculus is fuller: "And first, the body being laid on the ground, he who is called the scribe marks on its left side how far the incision is to be made. Then the so-called slitter (parachistes), having an Æthiopic stone, and cutting the flesh as far as the law allows, instantly runs off, the bystanders pursuing him and pelting him with stones, cursing him, and as it were, turning the horror of the deed upon him," for he who hurts a citizen is

held worthy of abhorrence. There are two kinds of stone knives found in excavations and tombs in Egypt, both of chipped flint, and very neatly made; one kind is like a very small cleaver, the other has more of the character of a lancet, and would seem the more suitable of the two for the embalmer's purpose.

Noteworthy from this point of view, is another description by Herodotus, that of the covenant of blood among the Arabians, where a man standing between the parties with a sharp stone made cuts in the inside of their hands, and with the blood smeared seven stones lying in the midst, calling on their deities Orotal and Alilat. A story related by Pliny, of the way in which the balsam of Judea, or "balm of Gilead," was extracted, comes under the same category. The incisions, he says, had to be made on the tree with knives of glass, stone, or bone, for it hurts it to wound its vital parts with iron, and it dies forthwith.

With regard to the reason of such practices as these, it has been suggested that there was a practical advantage in the use of the stone knife for circumcision, as less liable to cause inflammation than a knife of bronze or iron. From this point of view Pliny's statement has been quoted, that the mutilation of the priests of Cybele was done with a sherd of Samian ware (*Samiâ testâ*), as thus avoiding danger. But the idea of a stone instrument having any practical advantage over an iron one in cutting a living object, and even a dead body or a tree, will not meet with much acceptance. I cannot but think that most, if not all, of the series are to be explained as being, to use the word in no harsh sense, but according to what seems its proper etymology, cases of superstition, of the "standing over" of old habits into the midst of a new and changed state of things, of the retention of ancient practices for ceremonial purposes, long after they had been superseded for the commonplace uses of ordinary life. Such a view takes in every instance which has been mentioned, though the reason of iron not being adopted by the modern Jews in one case as well as in another is not clear. As to Pliny's story of the balm of Gilead, I am told, on competent authority, that the use of stone and such things instead of iron for making incisions in the tree, if ever it really existed, could be nothing but a superstition without any foundation in reason. It may perhaps tell in favor of the story being true, that it is only one of a number of cases mentioned by Pliny, of plants as to which the similar notion prevailed, that they would be spoiled by being touched with an iron instrument. There seems, on the whole, to be a fair case for believing that among the Israelites, as in Arabia, Ethiopia and Egypt, a ceremonial use of stone instruments long survived the general adoption of metal, and that such observances are to be interpreted as relics of an earlier Stone Age; while incidentally the same argument makes it probable that the rite of circumcision belonged to the Stone Age among the ancient Israelites, as we know it does among the modern Australians.

11. THE DIVISIONS OF PREHISTORIC TIME¹

By LORD AVEBURY

The first appearance of Man in Europe dates from a period so remote, that neither history, nor even tradition, can throw any light on his origin, or mode of life. Under these circumstances, some have supposed that the past is hidden from the present by a veil, which time will probably thicken, but never can remove. Thus our pre-historic antiquities have been valued as monuments of ancient skill and perseverance, not regarded as pages of ancient history; recognized as interesting vignettes, not as historical pictures. Some writers have assured us that, in the words of Palgrave, "We must give it up, that speechless past; whether fact or chronology, doctrine or mythology; whether in Europe, Asia, Africa, or America; at Thebes or Palenque, on Lycian shore or Salisbury Plain: lost is lost; gone is gone for ever." Others have taken a more hopeful view, but in attempting to reconstruct the story of the past, they have too often allowed imagination to usurp the place of research, and have written in the spirit of the novelist, rather than in that of the philosopher.

Of late years, however, a new branch of knowledge has arisen; a new Science has, so to say, been born among us, which deals with times and events far more ancient than any which have yet fallen within the province of the archaeologist. The geologist reckons not by days or by years; the whole six thousand years, which were until lately looked on as the sum of the world's existence, are to him but one unit of measurement in the long succession of past ages. Our knowledge of geology is, of course, very incomplete; on some questions we shall no doubt see reason to change our opinion, but on the whole, the conclusions to which it points are as definite as those of zoology, chemistry, or any of the kindred sciences. Nor does there appear to be any reason why those methods of examination which have proved so successful in geology, should not also be used to throw light on the history of man in pre-historic times. Archaeology forms, in fact, the link between geology and history. It is true that in the case of other animals we can, from their bones and teeth, form a definite idea of their habits and mode of life, while in the present state of our knowledge the skeleton of a savage could not always be distinguished from that of a philosopher. But on the other hand, while other

¹From pages 1-5 of Sir John Lubbock, [later Lord Avebury,] *Pre-historic Times, as illustrated by Ancient Remains, and the Manners and Customs of Modern Savages*, 1865.

animals leave only teeth and bones behind them, the men of past ages are to be studied principally by their works; houses for the living, tombs for the dead, fortifications for defence, temples for worship, implements for use, and ornaments for decoration.

From the careful study of the remains which have come down to us, it would appear that Pre-historic Archaeology may be divided into four great epochs.

I. That of the Drift; when man shared the possession of Europe with the Mammoth, the Cave bear, the Woolly-haired rhinoceros, and other extinct animals. This we may call the "Palaeolithic" period.

II. The later or polished Stone Age; a period characterized by beautiful weapons and instruments made of flint and other kinds of stone; in which, however, we find no trace of the knowledge of any metal, excepting gold, which seems to have been sometimes used for ornaments. This we may call the "Neolithic" period.

III. The Bronze Age, in which bronze was used for arms and cutting instruments of all kinds.

IV. The Iron Age, in which that metal had superseded bronze for arms, axes, knives, etc.; bronze, however, still being in common use for ornaments, and frequently also for the *handles* of swords and other arms, though never for the blades.

Stone weapons, however, of many kinds were still in use during the Age of Bronze, and even during that of Iron, so that the mere presence of a few stone implements is not in itself sufficient evidence that any given "find" belongs to the Stone Age. In order to prevent misapprehension, it may also be well to state, at once, that, for the present, I only apply this classification to Europe, though, in all probability, it might be extended also to the neighbouring regions of Asia and Africa. As regards other civilized countries, China and Japan for instance, we, as yet, know nothing of their pre-historic archaeology. It is evident, also, that some nations, such as the Fuegians, Andamaners, etc., are even now, or were very lately, in an Age of Stone.

It is probable that gold was the metal which first attracted the attention of man; it is found in many rivers, and by its bright colour would certainly attract even the rudest savages, who are known to be very fond of personal decoration. Silver does not appear to have been discovered until long after gold, and was apparently preceded by both copper and tin, as it is rarely, if ever, found in tumuli of the Bronze Age; but, however this may be, copper seems to have been the metal which first became of real importance to man: no doubt owing to the fact that its ores are abundant in many countries, and can be smelted without difficulty; and that, while iron is hardly ever found except in the form of ore, copper often occurs in a native condition, and can be beaten at once into shape. Thus, for instance, the North American Indians obtained pure copper from the mines near Lake Superior and elsewhere, and hammered it at once into axes, bracelets, and other objects.

Tin also early attracted notice, probably on account of the great heaviness of its ores. When metals were very scarce, it would naturally sometimes happen that, in order to make up the necessary quantity, some tin would be added to copper, or *vice versa*. It would then be found that the properties of the alloy were quite different from those of either metal, and a very few experiments would determine the most advantageous proportion, which for axes and other cutting instruments is about nine parts of copper to one of tin. No implements or weapons of tin have yet been found, and those of copper are extremely rare, whence it has been inferred that the art of making bronze was known elsewhere, before the use of either was introduced into Europe. Many of the so-called "copper" axes, etc., contain a small proportion of tin; and the few exceptions indicate probably a mere temporary want, rather than a total ignorance, of this metal.

The ores of iron, though more abundant, are much less striking in appearance than those of copper. Moreover, though they are perhaps more easily reduced, the metal, when obtained, is much less tractable than bronze. This valuable alloy can very easily be cast, and, in fact, all the weapons and implements made of it in olden times were cast in moulds of sand or stone. The art of casting iron, on the other hand, was unknown until a comparatively late period. . . .

Hesiod, who is supposed to have written about 900 B. C., and who is the earliest European author whose works have come down to us, appears to have lived during the transition between the Bronze and Iron Ages. He distinctly states that iron was discovered after copper and tin. Speaking of those who were ancient, even in his day, he says that they used bronze, and not iron. . . . His poems, as well as those of Homer, show that nearly three thousand years ago, the value was known and appreciated. . . . We may, therefore, consider that the Trojan war took place during the period of transition from the Bronze to the Iron Age.

In the Pentateuch, excluding Deuteronomy, bronze, or as it is unfortunately translated, brass, is mentioned thirty-eight times, and iron only four times.

12. SOME PRINCIPLES OF MENDELIAN HEREDITY¹

By IRVING FISHER

I have sometimes said that eugenics is hygiene raised to the highest power. It is a comparatively new movement, but one which is sweeping over the world with wonderful rapidity, and taking hold of the emotions of mankind in a way that no other movement has ever done, or has deserved to do.

First of all, what is eugenics? Eugenics, as the Greek derivation of the word shows, means the science of right breeding. The word was invented by Sir Francis Galton, of England, to express his ideal of founding a world movement to improve the human race. It was, of course, a colossal ambition, and, at first, almost everybody scoffed. Even today there are comparatively few who realize how immediately practical is this dream of Sir Francis Galton's.

Eugenics does not mean, as many people at first thought, anything like the old Spartan practice of infanticide. The Spartans tried to develop a strong, physical race according to their ideals, and they succeeded, but they did it in a cruel fashion by ruthlessly exposing children when born. Infanticide has been practiced in many of the barbarous countries of the world, and when eugenics was proposed, many people very naturally imagined this was what it meant. But it does not. Nor does eugenics propose to do violence in any other way to any humanitarian or Christian effort. Eugenics does not mean, as some have imagined, compulsory or government-made marriages. Some people have thought that eugenics was some half-baked scheme to breed the human race as we breed domestic animals, and to make a race of pug-noses or blond hair or blue eyes or any other fancy that some master of ceremonies should conceive. Nor does it mean a reduction in the proportion of love marriages. On the contrary, it means an increase of such marriages. Just as soon as men and women come to see and admire, as in ancient Greece, the ideal of physical perfection, they will fall in love on that basis, as nature always intended that they should. There will be less interference with love marriages through ambition to acquire property or title.

Eugenics is simply an application of modern science to improve the human race. "But," says the skeptic, "that will take millions of years!" Nevertheless, I reassert that it is easily practical to alter and improve the human race and to do so in a very short time.

This is the new optimism of eugenics, and it is based on solid evidence. Until recently no one realized how fast the race *could* improve if it *would*.

¹From *Eugenics Good Health Magazine*, XLVIII, 1913.

Even Galton himself, when he first proposed eugenics, was under the impression that we inherit from our ancestors in a way which would make possible improvement extremely slow. He put forward as a theory (what we now know to be incorrect) that each child gets half of its nature from its parents, one-quarter from its grandparents, one-eighth from its great grandparents, one-sixteenth from its great great grandparents, and so on indefinitely back, the sum total of those fractions being, when added up to infinity, just unity or the whole inheritance. Instead of such a relation holding true, however, we know that a child inherits something from both parents in relation to every character of body or mind, and that the something which it inherits from its mother, is by its mother inherited from one (not both) of its mother's parents, and likewise the something which it inherited from the father, was inherited from one (not both) of the father's parents, and so on in two streams on either side, from each parent backward. Thus each individual today is in respect to any one characteristic (such, for example, as eye-color) simply a combination of two beings in any previous generation. One generation back, it is the two parents from whom he gets his eye-color; two generations back it is two out of its four grandparents, and not the other two at all; three generations back, it is two of its great grandparents and not the other six at all. Consequently, if you can carry back your inheritance to someone who came over in the Mayflower, the chances are a thousand to one that you did not inherit any given character, such as eye-color, from that ancestor at all. In fact, you may have absolutely nothing in mind or body which came from him.

The marvelous laws of inheritance are now being fairly well explained and understood. They were discovered first by a priest named Mendel, in the year 1865. But when he gave his discovery to the world, he found the world was blind and deaf, as it often is, to new discoveries, and it waited until the beginning of the twentieth century, when De Vries and other scientists re-discovered the Mendelian principle, which today is the foundation stone of the science of heredity and eugenics.

We can best understand Mendel's laws by taking a few concrete cases. The first case is that of an Andalusian fowl. We shall consider the two species, pure bred black and pure bred white and confine ourselves to observing the inheritance of the single characteristic, *color*. Of course, as long as the black mate only with the black, the children will be black and as long as the white mate with white, the children will be white. But if a white mates with a black, the children will not be either black or white, but blue. All will be blue. But the most interesting facts appear in the next generation, when these hybrid blue fowls mate with black, or with white, or with each other. The original of the cross between the white and the black is an entirely new color, blue, which may be considered a sort of amalgam of black and white. But a cross between the blue and the black will not be any new color, but will be either black or blue—and the chances for the two are even. That is, in the long run, about half of the children of blue and black parents will be blue

and about half will be black. None of the children will be white. So also crossing the blue with the white will result in half of the children being blue and half white. Still more curious is the result of mating blue with blue. One might imagine that in this case all the children would be blue, but only half will be blue, while a quarter will be black and a quarter white.

These laws seem strange, but at bottom they are simply the familiar laws of chance, the laws which rule heads and tails in coin tossing. Two parents are like two baskets or bundles of traits from which the child takes its trait at random. In the wonderful play of Maeterlinck's, called "The Bluebird," we are taken to the "land before birth," where the children are waiting to be born, having selected their parents to be. Of course, this is only a pleasant fancy, like the advice of Oliver Wendell Holmes to children to choose good grand-parents, but it is a useful fancy which will help us to understand the laws of heredity. The child of the Andalusian fowl takes its color from its two parents on the same principle which operates in a lottery from which it would take two beans, white or black as the case might be, from each of two baskets. Every individual is a sort of basket containing millions of pairs of beans, as it were, each pair pertaining to a particular characteristic. It took one of each pair of these beans from each parent and will give one to each child.

With this picture of a bean lottery before us it is very easy to understand how the colors of Andalusian fowls are inherited. When two black fowls mate, the offspring must be black, because in this case each parent basket contains a pair of black beans, so to speak, so that the child taking one black bean from each basket will necessarily draw a black pair. For the same reason the child of two white fowls must be white. But when a black and white fowl mate, the child takes a white bean from one parent and a black from the other, its own color being a resultant or amalgam of the two, which in the case of the Andalusian fowl makes blue. Since every such hybrid child has this same combination of a white and a black bean all of these hybrids are alike. All are blue. It is important to remember that this hybrid blue is only a sort of mechanical mixture of black and white, and that the black and white are still separate beans, as it were.

But now suppose a hybrid or blue fowl to mate with a white. This means that the child takes from the white parent or basket one of the two white beans and from the blue parent or basket one of the two beans, of which one is white and the other black; the bean taken from the first or white basket must be white, but that taken from the second or blue or hybrid basket may be either white or black. It is a lottery with an even chance of drawing white or black. In the long run half of the children will draw white and half black. Those which draw the white will, since they also drew white from the other parent, be wholly white, but those which drew the black will be blue, since they will have one black and one white bean. We see too that the white child is just as truly white as though it had not had a hybrid parent, for of the two elements or beans which the hybrid carried, the black one was left

behind untaken. We see that the blue child is a hybrid exactly like its hybrid parent, and not any new kind of cross between the blue and the white. In short, the children of a blue and white are either the one or the other, and not a mixture. In the same way if a blue mates with a black, half of the children will be black and half blue.

Finally we come to the mating of a blue with a blue. Here the lottery is to pick a bean from two baskets, each basket containing a white and a black bean. When one is taken at random from either of these two baskets there is an even chance that the bean from the father is white or black and an even chance that the bean from the mother is white or black.

Now, what is the chance that the child draws a white bean from both baskets? Evidently it is one chance in four; for there are four ways equally probable in which you can take these beans, viz.: (1) black from the father basket and black from the mother, (2) white from the father and white from the mother, (3) white from the father and black from the mother, (4) black from the father and white from the mother. So the children could draw both white once in four times, both black once in four, and a white and a black in the other two cases. And that is why from two blue Andalusian fowls, on the average you will have one-quarter of the children black, one-quarter white, and the other two-quarters, blue. Again let us stop to emphasize the fact that the black children of these hybrids are just as pure blooded as their black grandparent, and will mate with other pure-blooded black in exactly the same way as though there had never been any white in their ancestry. The white strain has been left behind, or been "bred out."

We have spoken of only one character or characteristic—color. The same laws apply to other characters. Often different characters are inherited quite independently of one another. Each of us is a basket or bundle of very many qualities, each quality being a little compartment of the basket with two beans in it. There is, as it were, a pair of beans for every unit trait, whether that trait relates to color, to musical ability, or to any one of hundreds of other characteristics.

To summarize the laws of inheritance of the unit character called color in Andalusian fowl, we have really six ways in which we can consider the mating of the three colored fowls (black, white, blue): (1) black may mate with black, in which case all the offspring will be black, (2) white may mate with white, in which case all the offspring will be white, (3) black may mate with white, in which case the offspring will all be blue—a hybrid containing both black and white elements, (4) blue may mate with black, in which case half the offspring will be pure bred black, and half hybrid blue, (5) blue may mate with white, in which case half the offspring will be white and half blue, (6) blue may mate with blue, in which case a quarter of the offspring will be white, a quarter, black, and a half, blue.

These results are the fundamental laws of Mendel. But the results are not always clear as in the case of the Andalusian fowl. In that case the hybrids were not like either parent, but were a new color, blue, so that they were labeled at once and recognizable as hybrids—but this is not generally the case. Take, for instance, guinea pigs. What will be the result of mating an “albino” white with a black guinea pig? Quite exactly the same principle applies as in the case of the Andalusian fowl, but the principle is not as clear to see. All the offspring are hybrid, but they will not be blue, they will be black. They will look like the black parent, yet they are different. The black color predominates; i.e., black is “dominant” over white, while the white recedes out of sight, or is “recessive.” This hybrid black guinea pig is like the hybrid blue Andalusian fowl. It is a hybrid, a combination of white and black, but in the guinea pig the black covers up the white so that *nothing* in the color reveals the fact that it is a hybrid. Now if the hybrid black offspring of these black and white guinea pigs mate with each other, the result will follow exactly the same Mendelian law as applied to the Andalusian fowl. But this will not be so clear, because now we have two kinds of black instead of a black and a blue.

How then are we to distinguish between the one pure bred black, the thoroughbred, and the two blacks that are hybrids so that we can be sure which is which? The only way they can be distinguished is to wait and see what their offspring will be in the next succeeding generations. The one that is a thoroughbred will behave like a thoroughbred. For instance, if mated with white it will have nothing but black children. But if one that is hybrid black mate with one that is white, only half of the children will be white; these white children reveal the fact that their black parent was a half breed. Then we can put a tag on that black parent. If proper tags are put on the blacks so as to distinguish between the pure blooded and the half blooded—say a blue tag on the hybrids and a black on the thoroughbreds—we shall get exactly the same results as described in the case of the Andalusian fowl, in the six cases mentioned. The same principles apply to qualities of guinea pigs for characteristics other than color. Thus if a long-haired guinea pig mates with a short-haired guinea pig, all the offspring will be short-haired, because short hair is dominant over long hair. Again, if a smooth coated guinea pig mates with a rough coated one the resulting offspring will be rough coated, because a rough coat is dominant over a smooth coat.

By means of this Mendelian law it is thus possible to predict what will happen in various cases, not only for animals but for plants, and not only for the lower animals but for man himself. Mendel made his experiments mostly with plants. He took garden peas, twenty-two varieties. He crossed them and he found that when he crossed a wrinkled pea with a smooth pea all the children were smooth, but they were hybrids. They did not show any difference from one of the two parents. They showed a difference from the other, but they were hybrids nevertheless. They were not really thoroughbred

smooth peas, but they were hybrid smooth peas. Then he mated these hybrid smooth peas with each other and the peas in the next generation were one-quarter wrinkled and three-quarters smooth, but he discovered that of those three-quarters only one-quarter was really smooth in the sense that it would breed true ever after. The others were hybrids and bred just like their parents. Again he took peas which were tall and mated them with peas that were dwarfed and he found that all the children were tall.

In other words, the character of being smooth was dominant and the character of being wrinkled was recessive, while likewise the character of being tall was dominant and the character of being dwarf was recessive.

Again he took peas according to the color of the flower—those that had purple flowers and those that had white flowers—and he found that purple was dominant over white. When the two were crossed, the children would be all purple, but hybrid purple. If these hybrid purples were mated with each other, he found that one-quarter of the next generation would show white again according to the Mendelian law; one-quarter would be thoroughbred purple, and one half would be hybrid purple. And so he worked with a number of other varieties of peas and other plants.

The various characters of rough or smooth, long haired or short haired, white or black, etc., are inherited independently of one another. That it to say, the child takes from the mystic baskets one pair of beans relative to color, another relative to hair length, another relative to coat, and so on, so that it may be, for instance, long haired and rough coated, long haired and smooth coated, short haired and rough coated, or short haired and smooth coated.

This independent inheritance does not always hold true. Sometimes two traits always go together or always avoid each other. Again, a particular trait may be dominant to another trait but recessive to a third, or dominant in the male and recessive in the female. Each case must be studied by itself, but when the rule is found it can be depended on and used to predict what will happen in other like cases.

These laws are a curious mixture of chance and certainty. In certain circumstances, as we have seen, we can predict with certainty that the offspring will be black, white, blue, or whatever the case may be. In other circumstances we can only state what the *chances* are. But these chances can be definitely stated as one in two, one in four, or whatever it may be, and where there are large numbers of offspring this amounts to a practical certainty that definite proportions will have this or that color, or other characteristics.

Evidently such definite knowledge can be made useful, and it has been made useful in England. Professor Biffen has created, to order as it were, in accordance with specifications drawn up officially, certain new and valuable species of wheat. This he did by crossing existing species so as to get “hybrids” without the undesirable qualities and with the desirable ones. One species of wheat is resistant to “rust,” and another has a stout stalk, another is beardless, another bears a large number of grains on a stalk, another a large

yield per acre, but until Professor Biffen created it, no species possessed all these possibilities. By successive crossing of the existing species, however, he finally obtained species possessing all of these desirable qualities. Moreover, the desirable qualities were permanent because the other or undesirable qualities have been "bred out."

The same Mendelian principles undoubtedly apply to the human race, although as yet only a few traits have been carefully studied. Eye color is one of these. Imagine a marriage of a thoroughbred, black-eyed Italian with a thoroughbred, blue-eyed Irish. What will be the result? All the children will be black-eyed, black being dominant over blue; but these black eyes are not the genuine article that the Italian parent possessed. They are a blend, and it is only because the black element dominates over or conceals the blue element that we cannot see on the surface that there is any blue there. But it may come out in the next generation; for, if these half-blooded individuals marry among themselves, one-quarter of their children on the average will be blue-eyed. The other three-quarters will be black-eyed, but only one-quarter will be "really and truly" black-eyed, i.e., black-eyed like the Italian. The remaining half are hybrid black, like the parents. It is only a sort of imitation black, so to speak.

The appearance of blue eyes in the second generation is the long observed but formerly mysterious "atavism," or reversion to the grandparent.

Next, suppose the children of an Italian and an Irish parent intermarry with pure bred Italians. We immediately know what will be the result. All the children will be black-eyed, but among a large number only half will be thoroughbred black-eyed. The other half will be "imitation" black-eyed. The case is just like the mating of hybrid black guinea pigs with thoroughbred black guinea pigs, or of the blue fowl with the black. Similarly if the Irish-Italian hybrids marry with pure Irish, half the offspring will be blue-eyed and half will be hybrid black-eyed.

Black eyes are "dominant" over blue eyes because the black color is due to a pigment, while the blue color is due to the absence of this pigment. In general a quality which is due to the presence of some positive element is dominant over a quality due to the absence of that element. A child inheriting from a blue-eyed person simply draws a blank from that side in the lottery.

The case of skin color in human beings is more complicated. The skin color of an African is, according to the findings of Doctor Davenport, not a unit character but due to *four* factors. Without going into detailed explanations it follows, and the facts seem to substantiate the conclusion, that (1) the children (mulattos) of a white and a black parent have two color factors, and will all be of the same color midway between the colors of the parents; (2) the children of *two* mulattos will still be mulatto; (3) the offspring (quadroon) of a mulatto and a white will have *one* color factor and will all be alike midway between the parents, thus bringing us to a unit character; (4) the children of two quadroons will be quadroons; (5) the children (octoroons) of a quadroon

and a white will be all quadroon color but getting this color from only one side and drawing a blank as it were from the other side, they will be quite different from the true quadroons so that (6) of the children of two octoroons, one-quarter will be white, one-quarter quadroons and a half octoroons, like the parents; (7) of the children of octoroons and white, half will be octoroon and half will be white.

It is to be noted that when a white octoroon appears the black element has disappeared completely so that there is no danger of its reappearance in later generations from marriage with Caucasians. This does not mean, however, that all negro characteristics such as wooly hair, flat noses or thick lips, will disappear.

13. HEREDITARY GENIUS¹

By FRANCIS GALTON

I propose to show in this book that a man's natural abilities are derived by inheritance, under exactly the same limitations as are the form and physical features of the whole organic world. Consequently, as it is easy, notwithstanding those limitations, to obtain by careful selection a permanent breed of dogs or horses gifted with peculiar powers of running, or of doing anything else, so it would be quite practicable to produce a highly-gifted race of men by judicious marriages during several consecutive generations. I shall show that social agencies of an ordinary character, whose influences are little suspected, are at this moment working towards the degradation of human nature, and that others are working towards its improvement. I conclude that each generation has enormous power over the natural gifts of those that follow, and maintain that it is a duty we owe to humanity to investigate the range of that power, and to exercise it in a way that, without being unwise towards ourselves, shall be most advantageous to future inhabitants of the earth. . . .

The general plan of my argument is to show that high reputation is a pretty accurate test of high ability; next to discuss the relationships of a large body of fairly eminent men—namely, the Judges of England from 1660 to 1868, the Statesmen of the time of George III, and the Premiers during the last 100 years—and to obtain from these a general survey of the laws of heredity in respect to genius. Then I shall examine, in order, the kindred of the most illustrious Commanders, men of Literature and of Science, Poets, Painters, and Musicians, of whom history speaks. I shall also discuss the kindred of a certain selection of Divines and of modern Scholars. Then will follow a short chapter, by way of comparison, on the hereditary transmission of physical gifts, as deduced from the relationships of certain classes of Oarsmen and Wrestlers. Lastly, I shall collate my results, and draw conclusions. . . .

CLASSIFICATION OF MEN ACCORDING TO THEIR REPUTATION

The arguments by which I endeavour to prove that genius is hereditary, consist in showing how large is the number of instances in which men who are more or less illustrious have eminent kinsfolk. . . .

¹From Francis Galton, *Hereditary Genius: An Inquiry into Its Laws and Consequences*. (Pages 1–36, 55–64, 316–324, 336–342 have been drawn upon.)

I look upon social and professional life as a continuous examination. All are candidates for the good opinions of others, and for success in their several professions, and they achieve success in proportion as the general estimate is large of their aggregate merits. In ordinary scholastic examinations marks are allotted in stated proportions to various specified subjects—so many for Latin, so many for Greek, so many for English history, and the rest. The world, in the same way, but almost unconsciously, allots marks to men. It gives them for originality of conception, for enterprise, for activity and energy, for administrative skill, for various acquirements, for power of literary expression, for oratory, and much besides of general value, as well as for more specially professional merits. It does not allot these marks according to a proportion that can easily be stated in words, but there is a rough common-sense that governs its practice with a fair approximation to constancy. Those who have gained most of these tacit marks are ranked, by the common judgment of the leaders of opinion, as the foremost men of their day.

The metaphor of an examination may be stretched much further. As there are alternative groups in any one of which a candidate may obtain honours, so it is with reputations—they may be made in law, literature, science, art, and in a host of other pursuits. Again: as the mere attainment of a general fair level will obtain no honours in an examination, no more will it do so in the struggle for eminence. A man must show conspicuous power, in at least one subject in order to achieve a high reputation.

Let us see how the world classifies people, after examining each of them, in her patient, persistent manner, during the years of their manhood. How many men of “eminence” are there, and what proportion do they bear to the whole community?

I will begin by analysing a very painstaking biographical handbook, lately published by Routledge and Co., called “Men of the Time.” Its intention, which is very fairly and honestly carried out, is to include none but those whom the world honours for their ability. The catalogue of names is 2,500, and a full half of it consists of American and Continental celebrities. . . .

On looking over the book, I am surprised to find how large a proportion of the “Men of the Time” are past middle age. It appears that in the cases of high (but by no means in that of the highest) merit, a man must outlive the age of fifty to be sure of being widely appreciated. It takes time for an able man, born in the humbler ranks of life, to emerge from them and to take his natural position. It would not, therefore, be just to compare the numbers of Englishmen in the book with that of the whole adult male population of the British isles; but it is necessary to confine our examination to those of the celebrities who are past fifty years of age, and to compare their number with that of the whole male population who are also above fifty years. I estimate, from examining a large part of the book, that there are about 850 of these men, and that 500 of them are decidedly well known to persons familiar with literary and scientific society. Now, there are about two millions of adult males

in the British isles above fifty years of age; consequently, the total number of the "Men of the Time" are as 425 to a million, and the more select part of them as 250 to a million. . . .

Another estimate of the proportion of eminent men to the whole population was made on a different basis, and gave much the same result. I took the obituary of the year 1868, published in the *Times* on January 1st, 1869, and found in it about fifty names of men of the more select class. This was in one sense a broader, and in another a more rigorous selection than that which I have just described. It was broader, because I included the names of many whose abilities were high, but who died too young to have earned the wide reputation they deserved; and it was more rigorous, because I excluded old men who had earned distinction in years gone by, but had not shown themselves capable in later times to come again to the front. On the first ground, it was necessary to lower the limit of the age of the population with whom they should be compared. Forty-five years of age seemed to me a fair limit, including, as it was supposed to do, a year or two of broken health preceding decease. Now, 210,000 males die annually in the British isles above the age of forty-five; therefore, the ratio of the more select portion of the Men of the Time on these data is as 50 to 210,000, or as 238 to a million.

Thirdly, I consulted obituaries of many years back, when the population of these islands was much smaller, and they appeared to me to lead to similar conclusions, viz., that 250 to a million is an ample estimate. . . .

These considerations define the sense in which I propose to employ the word "eminent." When I speak of an eminent man, I mean one who has achieved a position that is attained by only 250 persons in each million of men, or by one person in each 4,000. 4,000 is a very large number—difficult for persons to realize who are not accustomed to deal with great assemblages. On the most brilliant of starlight night there are never so many as 4,000 stars visible to the naked eye at the same time; yet we feel it to be an extraordinary distinction to a star to be accounted as the brightest in the sky. This, be it remembered, is my narrowest area of selection. I propose to introduce no name whatever into my lists of kinsmen (unless it be marked off from the rest by brackets) that is less distinguished. . . .

CLASSIFICATION OF MEN ACCORDING TO THEIR NATURAL GIFTS

I have no patience with the hypothesis occasionally expressed, and often implied, especially in tales written to teach children to be good, that babies are born pretty much alike, and that the sole agencies in creating differences between boy and boy, and man and man, are steady application and moral effort. It is in the most unqualified manner that I object to pretensions of natural equality. The experiences of the nursery, the school, the University, and of professional careers, are a chain of proofs to the contrary. I acknowledge freely the great power of education and social influences in developing

the active powers of the mind, just as I acknowledge the effect of use in developing the muscles of a blacksmith's arm, and no further. Let the blacksmith labour as he will, he will find that there are certain feats beyond his power that are well within the strength of a man of herculean make, even although the latter may have led a sedentary life. Some years ago, the Highlanders held a grand gathering in Holland Park, where they challenged all England to compete with them in their games of strength. The challenge was accepted, and the well-trained men of the hills were beaten in the foot-race by a youth who was stated to be a pure Cockney, the clerk of a London banker.

Everybody who has trained himself to physical exercises discovers the extent of his muscular powers to a nicety. When he begins to walk, to row, to use the dumb bells, or to run, he finds to his great delight that his thews strengthen, and his endurance of fatigue increases day after day. So long as he is a novice, he perhaps flatters himself there is hardly an assignable limit to the education of his muscles; but the daily gain is soon discovered to diminish, and at last it vanishes altogether. His maximum performance becomes a rigidly determinate quantity. He learns to an inch, how high or how far he can jump, when he has attained the highest state of training. He learns to half a pound, the force he can exert on the dynamometer, by compressing it. He can strike a blow against the machine used to measure impact, and drive its index to a certain graduation, but no further. So it is in running, in rowing, in walking, and in every other form of physical exertion. There is a definite limit to the muscular powers of every man, which he cannot by any education or exertion overpass.

This is precisely analogous to the experience that every student has had of the working of his mental powers. The eager boy, when he first goes to school and confronts intellectual difficulties, is astonished at his progress. He glories in his newly-developed mental grip and growing capacity for application, and, it may be, fondly believes it to be within his reach to become one of the heroes who have left their mark upon the history of the world. The years go by; he competes in the examinations of school and college, over and over again with his fellows, and soon finds his place among them. He knows he can beat such and such of his competitors; that there are some with whom he runs on equal terms, and others whose intellectual feats he cannot even approach. Probably his vanity still continues to tempt him, by whispering in a new strain. It tells him that classics, mathematics, and other subjects taught in universities, are mere scholastic specialties, and no test of the more valuable intellectual powers. It reminds him of numerous instances of persons who had been unsuccessful in the competitions of youth, but who had shown powers in after-life that made them the foremost men of their age. Accordingly, with newly furbished hopes, and with all the ambition of twenty-two years of age, he leaves his University and enters a larger field of competition. The same kind of experience awaits him here that he has already gone

through. Opportunities occur—they occur to every man—and he finds himself incapable of grasping them. He tries, and is tried in many things. In a few years more, unless he is incurably blinded by self-conceit, he learns precisely of what performances he is capable, and what other enterprises lie beyond his compass. When he reaches mature life, he is confident only within certain limits, and knows, or ought to know, himself just as he is probably judged of by the world, with all his unmistakeable weakness and all his undeniable strength. He is no longer tormented into hopeless efforts by the fallacious promptings of overweening vanity, but he limits his undertakings to matters below the level of his reach, and finds true moral repose in an honest conviction that he is engaged in as much good work as his nature has rendered him capable of performing. . . .

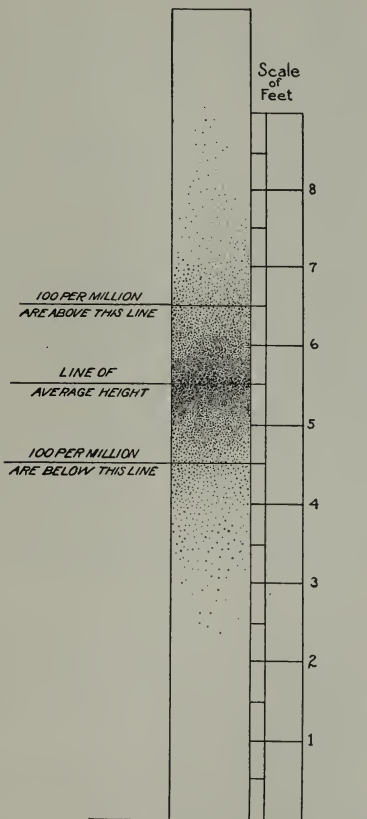
To conclude, the range of mental power between—I will not say the highest Caucasian and the lowest savage—but between the greatest and least of English intellects, is enormous. There is a continuity of natural ability reaching from one knows not what height, and descending to one can hardly say what depth. I propose in this chapter to range men according to their natural abilities, putting them into classes separated by equal degrees of merit, and to show the relative number of individuals included in the several classes. Perhaps some persons might be inclined to make an offhand guess that the number of men included in the several classes would be pretty equal. If he thinks so, I can assure him he is most egregiously mistaken.

The method I shall employ for discovering all this, is an application of the very curious theoretical law of “deviation from an average.” First, I will explain the law, and then I will show that the production of natural intellectual gifts comes justly within its scope.

The law is an exceedingly general one. M. Quetelet, the Astronomer-Royal of Belgium, and the greatest authority on vital and social statistics, has largely used it in his inquiries. He has also constructed numerical tables, by which the necessary calculations can be easily made, whenever it is desired to have recourse to the law. . . .

So much has been published in recent years about statistical deductions, that I am sure the reader will be prepared to assent freely to the following hypothetical case: Suppose a large island inhabited by a single race who intermarried freely, and who had lived for many generations under constant conditions; then the average *height* of the male adults of that population would undoubtedly be the same year after year. Also—still arguing from the experience of modern statistics, which are found to give constant results in far less carefully-guarded examples—we should undoubtedly find, year after year, the same proportion maintained between the number of men of different heights. I mean, if the average stature was found to be sixty-six inches, and if it was also found in any one year that 100 per million exceeded seventy-eight inches, the same proportion of 100 per million would be closely maintained in all other years. An equal constancy of proportion would be maintained

between any other limits of height we pleased to specify, as between seventy-one and seventy-two inches; between seventy-two and seventy-three inches; and so on. Statistical experiences are so invariably confirmatory of what I have stated would probably be the case, as to make it unnecessary to



describe analogous instances. Now, at this point, the law of deviation from an average steps in. It shows that the number per million whose heights range between seventy-one and seventy-two inches (or between any other limits we please to name) can be *predicted* from the previous datum of the average, and of any one other fact, such as that of 100 per million exceeding seventy-eight inches.

The diagram will make this more intelligible. Suppose a million of the men to stand in turns, with their backs against a vertical board of sufficient height, and their heights to be dotted off upon it. The board would then present the appearance shown in the diagram. The line of average height is that which divides the dots into two equal parts, and stands, in the case we have assumed, at the height of sixty-six inches. The dots will be found to be ranged so symmetrically on either side of the line of average, that the lower half of the diagram will be almost a precise reflection of the upper. Next, let a hundred dots be counted from above downwards, and let a line be drawn below them. According to the conditions, this line will stand at the height of seventy-eight inches. Using the data afforded by these two lines, it is possible, by the help of the law of deviation from an average, to reproduce, with extraordinary closeness, the entire system of dots on the board.

M. Quetelet gives tables in which the uppermost line, instead of cutting off 100 in a million, cuts off only one in a million. He divides the intervals between that line and the line of average, into eighty equal divisions, and gives the number of dots that fall within each of those divisions. It is easy, by the help of his tables, to calculate what would occur under any other system of classification we pleased to adopt.

This law of deviation from an average is perfectly general in its application. Thus, if the marks had been made by bullets fired at a horizontal line stretched in front of the target, they would have been distributed according to the same law. Wherever there is a large number of similar events, each due to the resultant influences of the same variable conditions, two effects will follow. First, the average value of those events will be constant; and, secondly, the deviations of the several events from the average, will be governed by this law (which is, in principle, the same as that which governs runs of luck at a gaming-table). . . .

I selected the hypothetical case of a race of men living on an island and freely intermarrying, to ensure the conditions under which they were all supposed to live, being uniform in character. It will now be my aim to show there is sufficient uniformity in the inhabitants of the British Isles to bring them fairly within the grasp of this law.

For this purpose, I first call attention to an example given in Quetelet's book. It is of the measurements of the circumferences of the chests of a large number of Scotch soldiers. The Scotch are by no means a strictly uniform race, nor are they exposed to identical conditions. They are a mixture of Celts, Danes, Anglo-Saxons, and others, in various proportions, the Highlanders being almost purely Celts. On the other hand, these races, though diverse in origin, are not very dissimilar in character. Consequently, it will be found that their deviations from the average, follow theoretical computations with remarkable accuracy. The instance is as follows. M. Quetelet obtained his facts from the thirteenth volume of the *Edinburgh Medical Journal*, where the measurements are given in respect to 5,738

TABLE I
SCOTCH SOLDIERS

Measures of the chest in inches	Number of men per 1,000, by experience	Number of men per 1,000, by calculation	Measures of the chest in inches	Number of men per 1,000, by experience	Number of men per 1,000, by calculation
33	5	7	41	1,628	1,675
34	31	29	42	1,148	1,096
35	141	110	43	645	560
36	322	323	44	160	221
37	732	732	45	87	69
38	1,305	1,333	46	38	16
39	1,867	1,838	47	7	3
40	1,882	1,987	48	2	1

soldiers, the results being grouped in order of magnitude, proceeding by differences of one inch. Professor Quetelet compares these results with those that his tables give, and here is the result. The marvellous accordance between fact and theory must strike the most unpractised eye. I should say that, for the sake of convenience, both the measurements and calculations have been reduced to per thousandths.

I argue from the results obtained from Frenchmen and from Scotchmen, that, if we had measurements of the adult males in the British Isles, we should find those measurements to range in close accordance with the law of deviation from an average, although our population is as much mingled as I described that of Scotland to have been, and although Ireland is mainly peopled with Celts. Now, if this be the case with stature, then it will be true as regards every other physical feature—as circumference of head, size of brain, weight of grey matter, number of brain fibres, etc.; and thence, by a step on which no physiologist will hesitate, as regards mental capacity.

This is what I am driving at—the analogy clearly shows there must be a fairly constant average mental capacity in the inhabitants of the British Isles, and that the deviations from that average—upwards towards genius, and downwards towards stupidity—must follow the law that governs deviations from all true averages. . . .

The number of grades into which we may divide ability is purely a matter of option. We may consult our convenience by sorting Englishmen into a few large classes, or into many small ones. I will select a system of classification that shall be easily comparable with the numbers of eminent men, as determined in the previous chapter. We have seen that 250 men per million become eminent; accordingly, I have so contrived the classes in the following table with the two highest, F and G, together with X (which includes all cases beyond G, and which are unclassified), shall amount to about that number—namely, to 248 per million.

It will, I trust, be clearly understood that the numbers of men in the several classes in my table depend on no uncertain hypothesis. They are determined by the assured law of deviations from an average. It is an absolute fact that if we pick out of each million the one man who is naturally the ablest, and also the one man who is the most stupid, and divide the remaining 999,998 men into fourteen classes, the average ability in each being separated from that of its neighbours by *equal grades*, then the numbers in each of those classes will, on the average of many millions, be as is stated in the table. The table may be applied to special, just as truly as to general ability. It would be true for every examination that brought out natural gifts, whether held in painting, in music, or in statesmanship. The proportions between the different classes would be made up of different individuals, according as the examination differed in its purport.

It will be seen that more than half of each million is contained in the two mediocre classes a and A; the four mediocre classes a, b, A, B, contain more

TABLE II
CLASSIFICATION OF MEN ACCORDING TO THEIR NATURAL GIFTS

Grades of natural ability, separated by equal intervals		Proportionate, viz. one in	Numbers of men comprised in the several grades of natural ability, whether in respect to their general powers, or to special aptitudes							
Below average	Above average		In each million of the same age	In total male population of the United Kingdom, viz. 15 millions, of the undermentioned ages:—						
				20-30	30-40	40-50	50-60	60-70	70-80	
a	A	4	256,791	651,000	495,000	391,000	268,000	171,000	77,000	
b	B	6	162,279	409,000	312,000	246,000	168,000	107,000	48,000	
c	C	16	63,563	161,000	123,000	97,000	66,000	42,000	19,000	
d	D	64	15,696	39,800	30,300	23,900	16,400	10,400	4,700	
e	E	413	2,423	6,100	4,700	3,700	2,520	1,600	729	
f	F	4,300	233	590	450	355	243	155	70	
g	G	79,000	14	35	27	21	15	9	4	
x all grades below g	X all grades above G	1,000,000	1	3	2	2	2	..	..
On either side of average.....			500,000	1,268,000	964,000	761,000	521,000	332,000	149,000	
Total, both sides.....			1,000,000	2,536,000	1,928,000	1,522,000	1,042,000	664,000	298,000	

than four-fifths, and the six mediocre classes more than nineteen-twentieths of the entire population. Thus, the rarity of commanding ability, and the vast abundance of mediocrity, is no accident, but follows of necessity, from the very nature of these things. . . .

The class C possesses abilities a trifle higher than those commonly possessed by the foreman of an ordinary jury. D includes the mass of men who obtain the ordinary prizes of life. E is a stage higher. Then we reach F, the lowest of those yet superior classes of intellect, with which this volume is chiefly concerned. . . .

THE JUDGES OF ENGLAND BETWEEN 1660 AND 1865

The Judges of England, since the restoration of the monarchy in 1660, form a group peculiarly well adapted to afford a general outline of the extent and limitations of heredity in respect to genius. A judgeship is a guarantee of its possessor being gifted with exceptional ability; the Judges are sufficiently numerous and prolific to form an adequate basis for statistical inductions, and they are the subjects of several excellent biographical treatises. It is therefore well to begin our inquiries with a discussion of their relationships. We shall quickly arrive at definite results, which subsequent chapters, treating of more illustrious men, and in other careers, will check and amplify.

It is necessary that I should first say something in support of my assertion, that the office of a judge is really a sufficient guarantee that its possessor is exceptionally gifted. In other countries it may be different to what it is with us, but we all know that in England, the Bench is never spoken of without reverence for the intellectual power of its occupiers. A seat on the Bench is a great prize, to be won by the best men. . . .

If not always the foremost, the Judges are therefore among the foremost, of a vast body of legal men. . . .

There are 286 judges within the limits of my inquiry; 109 of them have one or more eminent relations, and three others have relations whom I have noticed, but they are marked off with brackets, and are therefore not to be included in the following statistical deductions. . . .

First, it will be observed, that the judges are so largely interrelated, that 109 of them are grouped into only 85 families. There are seventeen doublets, among the judges, two triplets, and one quadruplet. In addition to these, might be counted six other sets, consisting of those whose ancestors sat on the Bench previously to the accession of Charles II., namely, Bedingfield, Forster, Hyde, Finch, Windham, and Lyttleton. Another fact to be observed, is the nearness of the relationships in my list. The single letters are far the most common. Also, though a man has twice as many grandfathers as fathers, and probably more than twice as many grandsons as sons, yet the Judges are found more frequently to have eminent fathers than grandfathers, and eminent sons than grandsons. In the third degree of relationship, the

TABLE III

Degrees of Kinship						
Name of the degree	Corresponding letter					
		A.	B.	C.	D.	E.
1 Degree—						
Father.....	22 F.	22	26	100	26.0	9.1
Brother.....	30 B.	30	35	150	23.3	8.2
Son.....	31 S.	31	36	100	36.0	12.6
2 Degrees—						
Grandfather.....	7 G.	13	15	200	7.5	2.6
Uncle.....	9 U.	15	18	400	4.5	1.6
Nephew.....	14 N.	16	19	400	4.75	1.7
Grandson.....	11 P.	16	19	200	9.5	3.7
3 Degrees—						
Great-grandfather.....	1 GF.	2	2	400	0.5	0.2
Great-uncle.....	1 GB.	3	4	800	0.5	0.2
First-cousin.....	5 US.	9	11	800	1.4	0.5
Great-nephew.....	7 NS.	15	17	800	2.1	0.7
Great-grandson.....	2 PS.	5	6	400	1.5	0.5
All more remote.....	.....	12	14	?	0.0	0.0

A. Number of eminent men in each degree of kinship to the most eminent man of the family (85 families).
B. The preceding column raised in proportion to 100 families.
C. Number of individuals in each degree of kinship to 100 men.
D. Percentage of eminent men in each degree of kinship to the most eminent member of distinguished families; it was obtained by dividing B by C and multiplying by 100.
E. Percentages of the previous column reduced in the proportion of (286—24, or) 242 to 85, in order to apply to families generally.

eminent kinsmen are yet more rare, although the number of individuals in those degrees is increased in a duplicate proportion. When a judge has no more than one eminent relation, that relation is nearly always to be found in the first or second degree. . . . I annex a table (Table III). . . . which exhibits these facts with great clearness. Column A contains the facts just as they were observed, and column D shows the percentage of individuals, in each degree of kinship to every 100 judges, who have become eminent.

What I profess to prove is this: that if two children are taken, of whom one has a parent exceptionally gifted in a high degree—say as one in 4,000, or as one in a million—and the other has not, the former child has an enormously greater chance of turning out to be gifted in a high degree, than the other. Also, I argue that, as a new race can be obtained in animals and plants, and can be raised to so great a degree of purity that it will maintain itself, with moderate care in preventing the more faulty members of the flock from breeding, so a race of gifted men might be obtained, under exactly similar conditions. . . .

COMPARISON OF RESULTS

Let us now bring our scattered results side to side, for the purpose of comparison, and judge of the extent to which they corroborate one another,—how far they confirm the provisional calculations made in the chapter on Judges from more scanty data, and where and why they contrast.

The number of cases of hereditary genius analysed in the several chapters of my book, amounts to a large total. I have dealt with no less than 300 families containing between them nearly 1,000 eminent men, of whom 415 are illustrious, or, at all events, of such note as to deserve being printed in black type at the head of a paragraph. If there be such a thing as a decided law of distribution of genius in families, it is sure to become manifest when we deal statistically with so large a body of examples.

In comparing the results obtained from the different groups of eminent men, it will be our most convenient course to compare the columns B of the several tables. Column B gives the number of kinsmen in various degrees, on the supposition that the number of families in the group to which it refers is 100. All the entries under B have therefore the same common measure, they are all *percentages*, and admit of direct intercomparison. I hope I have made myself quite clear: lest there should remain any misapprehension, it is better to give an example. Thus, the families of Divines are only 25 in number, and in those 25 families there are 7 eminent fathers, 9 brothers, and 10 sons; now in order to raise these numbers to percentages, 7, 9, and 10 must be multiplied by the number of times that 25 goes into 100, namely by 4. They will then become 28, 36, and 40. . . .

The general uniformity in the distribution of ability among the kinsmen in the different groups, is strikingly manifest. The eminent sons are almost invariably more numerous than the eminent fathers. On proceeding further

TABLE IV
Separate Groups

Number of families, each containing more than one eminent man.....	85	39	27	33	43	20	28	25	All Groups together			
									300			
Total number of eminent men in all the families.....	262	130	89	119	148	57	97	75	977			
Judges	B.	B.	B.	B.	B.	B.	B.	B.	Illustrous and Eminent Men of all Classes			
Statesmen	B.	B.	B.	B.	B.	B.	B.	B.				
Commanders	B.	B.	B.	B.	B.	B.	B.	B.	B.	C.	D.	
Literary	B.	B.	B.	B.	B.	B.	B.	B.	B.	C.	D.	
Scientific	B.	B.	B.	B.	B.	B.	B.	B.	B.	C.	D.	
Poets	B.	B.	B.	B.	B.	B.	B.	B.	B.	C.	D.	
Artists	B.	B.	B.	B.	B.	B.	B.	B.	B.	C.	D.	
Divines	B.	B.	B.	B.	B.	B.	B.	B.	B.	C.	D.	
Father.....	26	33	47	48	26	20	32	28	31	100	31	
Brother.....	35	39	50	42	47	40	50	36	41	150	27	
Son.....	36	49	31	51	60	45	89	40	48	100	48	
Grandfather.....	15	28	16	24	14	5	7	20	17	200	8	
Uncle.....	18	18	8	24	16	5	14	40	18	400	5	
Nephew.....	19	18	35	24	23	50	18	4	22	400	5	
Grandson.....	19	10	12	9	14	5	18	16	14	200	7	
Great-grandfather.....	2	8	8	3	0	0	0	4	3	400	1	
Great-uncle.....	4	5	8	6	5	5	7	4	5	800	1	
First cousin.....	11	21	20	18	16	0	1	8	13	800	2	
Great-nephew.....	17	5	8	6	16	10	0	0	10	800	1	
Great-grandson.....	6	0	0	3	7	0	0	0	3	400	1	
All more remote.....	14	37	44	15	23	5	18	16	31	?	....

down the table, we come to a sudden dropping off of the numbers at the second grade of kinship, namely, at the grandfathers, uncles, nephews, and grandsons: this diminution is conspicuous in the entries in column D, the meaning of which has already been described. On reaching the third grade of kinship, another abrupt dropping off in numbers is again met with, but the first cousins are found to occupy a decidedly better position than other relations within the third grade. . . .

I reckon the chances of kinsmen of illustrious men rising, or having risen, to be $15\frac{1}{2}$ to 100 in the case of fathers, $13\frac{1}{2}$ to 100 in the case of brothers, 24 to 100 in the case of sons. Or, putting these and the remaining proportions into a more convenient form, we obtain the following results. In first grade: the chance of the father is 1 to 6; of each brother, 1 to 7; of each son, 1 to 4. In second grade: of each grandfather, 1 to 25; of each uncle, 1 to 40; of each nephew, 1 to 40; of each grandson, 1 to 29. In the third grade, the chance of each member is about 1 to 200, excepting in the case of first cousins, where it is 1 to 100. . . .

THE COMPARATIVE WORTH OF DIFFERENT RACES

I have now completed what I have to say concerning the kinships of individuals, and proceed, in this chapter, to attempt a wider treatment of my subject, through a consideration of nations and races. . . .

Let us, then, compare the negro race with the Anglo-Saxon, with respect to those qualities alone which are capable of producing judges, statesmen, commanders, men of literature and science, poets, artists, and divines. If the negro race in America had been affected by no social disabilities, a comparison of their achievements with those of the whites in their several branches of intellectual effort, having regard to the total number of their respective populations, would give the necessary information. As matters stand, we must be content with much rougher data.

First, the negro race has occasionally, but very rarely, produced such men as Toussaint l'Ouverture, who are of our class F; that is to say, its X, or its total classes above G, appear to correspond with our F, showing a difference of not less than two grades between the black and white races, and it may be more.

Secondly, the negro race is by no means wholly deficient in men capable of becoming good factors, thriving merchants, and otherwise considerably raised above the average of whites—that is to say, it can not infrequently supply men corresponding to our class C, or even D. It will be recollected that C implies a selection of 1 in 16, or somewhat more than the natural abilities possessed by average foremen of common juries, and that D is as 1 in 64—a degree of ability that is sure to make a man successful in life. In short, classes E and F, of the negro may roughly be considered as the equivalent of our C and D—a result which again points to the conclusion, that the average intellectual standard of the negro race is some two grades below our own.

Thirdly, we may compare, but with much caution, the relative position of negroes in their native country with that of the travellers who visit them. The latter, no doubt, bring with them the knowledge current in civilized lands, but that is an advantage of less importance than we are apt to suppose. A native chief has as good an education in the art of ruling men, as can be desired; he is continually exercised in personal government, and usually maintains his place by the ascendancy of his character, shown every day over his subjects and rivals. A traveller in wild countries also fills, to a certain degree, the position of a commander, and has to confront native chiefs at every inhabited place. The result is familiar enough—the white traveller almost invariably holds his own in their presence. It is seldom that we hear of a white traveller meeting with a black chief whom he feels to be the better man. I have often discussed this subject with competent persons, and can only recall a few cases of the inferiority of the white man,—certainly not more than might be ascribed to an average actual difference of three grades, of which one may be due to the relative demerits of native education, and the remaining two to a difference in natural gifts. . . .

The ablest race of whom history bears record is unquestionably the ancient Greek, partly because their master-pieces in the principal departments of intellectual activity are still unsurpassed, and in many respects unequalled, and partly because the population that gave birth to the creators of those master-pieces was very small. Of the various Greek sub-races, that of Attica was the ablest, and she was no doubt largely indebted to the following cause, for her superiority. Athens opened her arms to immigrants, but not indiscriminately, for her social life was such that none but very able men could take any pleasure in it; on the other hand, she offered attractions such as men of the highest ability and culture could find in no other city. Thus, by a system of partly unconscious selection, she built up a magnificent breed of human animals, which, in the space of one century—viz., between 530 and 430 B.C.—produced the following illustrious persons, fourteen in number:

Statesmen and Commanders.—Themistocles (mother an alien), Miltiades, Aristides, Cimon (son of Miltiades), Pericles (son of Xanthippus, the victor at Mycale).

Literary and Scientific Men.—Thucydides, Socrates, Xenophon, Plato.

Poets.—Æschylus, Sophocles, Euripides, Aristophanes.

Sculptor.—Phidias.

We are able to make a closely-approximate estimate of the population that produced these men, because the number of the inhabitants of Attica has been a matter of frequent inquiry, and critics appear at length to be quite agreed in the general results. It seems that the little district of Attica contained, during its most flourishing period (Smith's Class. Geog. Dict.), less than 90,000 native free-born persons, 40,000 resident aliens, and a labouring and artisan population of 400,000 slaves. The first item is the only one that concerns us here, namely, the 90,000 free-born persons. Again, the common estimate

that population renews itself three times in a century is very close to the truth, and may be accepted in the present case. Consequently, we have to deal with a total population of 270,000 free-born persons, or 135,000 males, born in the century I have named. Of these, about one-half, or 67,500, would survive the age of 26, and one-third, or 45,000, would survive that of 50. As 14 Athenians became illustrious, the selection is only 1 to 4,822 in respect to the former limitation, and as 1 to 3,214 in respect to the latter. Referring to the table on page 139, it will be seen that this degree of selection corresponds very fairly to the classes F (1 in 4,300) and above, of the Athenian race. Again, as G is one-sixteenth or one-seventeenth as numerous as F, it would be reasonable to expect to find one of class G among the fourteen; we might, however, by accident, meet with two, three, or even four of that class—say Pericles, Socrates, Plato, and Phidias.

Now let us attempt to compare the Athenian standard of ability with that of our own race and time. We have no men to put by the side of Socrates and Phidias, because the millions of all Europe, breeding as they have done for the subsequent 2,000 years, have never produced their equals. They are, therefore, two or three grades above our G—they might rank as I or J. But, supposing we do not count them at all, saying that some freak of nature acting at that time, may have produced them, what must we say about the rest? Pericles and Plato would rank, I suppose, the one among the greatest of philosophical statemen, and the other as at least the equal of Lord Bacon. They would, therefore, stand somewhere among our unclassified X, one or two grades above G—let us call them between H and I. All the remainder—the F of the Athenian race—would rank above our G, and equal to or close upon our H. It follows from all this, that the average ability of the Athenian race is, on the lowest possible estimate, very nearly two grades higher than our own—that is, about as much as our race is above that of the African negro.

14. MENTAL AND MORAL INHERITANCE¹

By KARL PEARSON

There are probably few persons who would now deny the immense importance of ancestry in the case of any domestic animal. The stud-books, which exist for horses, cattle, dogs, cats and even canaries, demonstrate the weight practically given to ancestry when the breeding of animals has developed so far that certain physical characters possess commercial value. A majority of the community would probably also admit today that the physical characters of man are inherited with practically the same intensity as the like characters in cattle and horses. But few, however, of the majority who accept this inheritance of physique in man, apply the results which flow from such acceptance to their own conduct in life—still less do they appreciate the all important bearing of these results upon national life and social habits. Nor is the reason for this—or better, one out of several reasons for this—hard to find. The majority of mankind are more or less conscious that man has not gained his pre-eminence by physique alone. They justly attribute much of his dominance in the animal kingdom to those mental and moral characters, which have rendered him capable of combining with his neighbours to form stable societies with highly differentiated tasks and circumscribed duties for their individual members.

Within such communities we see the moral characters developing apparently under family influences; the mental characters developing not only under home training, but under the guidance of private and public teachers, the whole contributing to form a complex system of national education. To use technical terms, we expect correlation between home influence and moral qualities, and between education and mental power, and the bulk of men too rashly, perhaps, conclude that the home and the school are the chief sources of those qualities on which social stability so largely depends. We are too apt to overlook the possibility that the home standard is itself a product of parental stock, and that the relative gain from education depends to a surprising degree on the raw material presented to the educator. We are agreed that good homes and good schools are essential to national prosperity. But does not the good

¹From Karl Pearson, "On the Inheritance of the Mental and Moral Characters in Man, and Its Comparison with the Inheritance of the Physical Characters," in *Journal of the [Royal] Anthropological Institute [of Great Britain and Ireland]*, volume 33, pages 179–207, 1903.

home depend upon the percentage of innately wise parents, and the good school depend quite as much on the children's capacity, as on its staff and equipment?

It is quite possible to accept these views and yet believe that the moral and mental characters are inherited in either a quantitatively or a qualitatively different manner from the physical characters. Both may be influenced by environment, but the one in a far more marked way than the other. Since the publication of Francis Galton's epoch-making books, *Hereditary Genius* and *English Men of Science*, it is impossible to deny *in toto* the inheritance of mental characters. But we require to go a stage further and ask for an exact quantitative measure of the inheritance of such characters and a comparison of such measure with its value for the physical characters.

Accordingly some six or seven years ago I set myself the following problem: What is the quantitative measure of the inheritance of the moral and mental characters in man, and how is it related to the corresponding measure of the inheritance of the physical characters?

The problem really resolved itself into three separate investigations:

(a) A sufficiently wide inquiry into the actual values of inheritance of the physical characters in man.

This investigation was carried out by the measurement of upwards of 1000 families. We thus obtained ample means of determining both for parental and fraternal relationships the quantitative measure of resemblance.

(b) A comparison of the inheritance of the physical characters in man with that of the physical characters in other forms of life.

This has been made for a considerable number of characters in diverse species, with the general result that there appears to be no substantial difference, as far as we have been able to discover, between the inheritance of physique in man, and its inheritance in other forms of life.

(c) An inquiry into the inheritance of the moral and mental characters in man.

This is the part of my work with which we are at present chiefly concerned, and I want to indicate the general lines along which my argument runs.

In the first place it seemed to me absolutely impossible to get a quantitative measure of the resemblance in moral and mental characters between parent and offspring. You must not compare the moral character of a child with those of its adult parents. You can only estimate the resemblance between the child and what its parents were as *children*. Here the grandparent is the only available source of information; but not only does age affect clearness of memory and judgment, the partiality of the relative is a factor which can hardly be corrected and allowed for. If we take, on the other hand, parents and offspring as adults, it is difficult to appeal to anything but the *vox populi* for an estimate of their relative moral merits, and this *vox* is generally silent unless both are men of marked public importance. For these and other reasons I gave up any hope of measuring parental resemblance in moral character. I confined my attention entirely to *fraternal* resemblance. My argument was of this kind. Regarding one species only, then if fraternal resemblance for the moral and mental characters be less than, equal to, or

greater than fraternal resemblance for the physical characters, we may surely argue that parental inheritance for the former set of characters is less than, equal to, or greater than that for the latter set of characters.

In the next place it seemed impossible to obtain moderately impartial estimates of the moral and mental characters of *adults*. Who but relatives and close friends know them well enough to form such an estimate, and which of us will put upon paper, for the use of strangers, a true account of the temper, probity and popularity of our nearest? Even if relatives and friends could be trusted to be impartial, the discovery of the preparation of schedules by the subjects of observation might have ruptured the peace of households and broken down life-long friendships. Thousands of schedules could not be filled up in this manner. The inquiry, therefore, resolved itself into an investigation of the moral and mental characters of *children*. Here we could replace the partial parent or relative by the fairly impartial school teacher. A man or woman who deals yearly with forty to a hundred new children, rapidly forms moderately accurate classifications, and it was to this source of information that I determined to appeal. . . .

To illustrate the method I will examine a little at length the degree of resemblance of brothers in a physical character. I choose cephalic index and this for two reasons:

(a) Because from the first few years of life onwards the cephalic index scarcely changes with growth.

I have not yet investigated my own school data from this standpoint, but I have every confidence in the care taken by the late Dr. W. Pfitzner in his elaborate system of measurements, and the above is the conclusion he reaches.

(b) Several great authorities have recently stated that they do not "believe" in the cephalic index, *i. e.*, consider it of small value for anthropometric purposes.

In the Appendix,² we have the cephalic index given for 1982 pairs of brothers. This table is, I hope, perfectly intelligible. Taking the boys, for example, with cephalic indices between 74 and 75, these boys had 78 brothers who were distributed according to the arrangement in the column headed 74 to 75. Brothers are not alike in cephalic index, but distributed with a considerable range of variation. We now take in the usual way the arithmetic mean of this array of brothers, and find it to be 77.45. The average brother of a boy with cephalic index = 74.5 has an index of 77.45. This is the phenomenon of regression towards the general population mean (78.9) as discovered by Francis Galton. Now turning to Diagram 1 we plot to 74.5, the mean brother 77.45, and doing this for all arrays we get the series of points there exhibited. You will see at once that they lie almost exactly on a straight line. This is the well-known regression line. If that line has a slope of 1 in 1, the brother of 74.5 would have a mean brother of 74.5 cephalic index.

²Omitted here.

If it had no slope at all the brother of 74.5 would have a brother like the mean of the general population. In the one case we have absolute resemblance, in the other case no resemblance at all. The actual degree of resemblance, our brothers being equally variable, is measured by the steepness of this regression line. In our case that steepness is .49, almost .5 or 1 in 2. That is the measure of fraternal resemblance in brothers for cephalic index—the correlation between brothers as we term it.

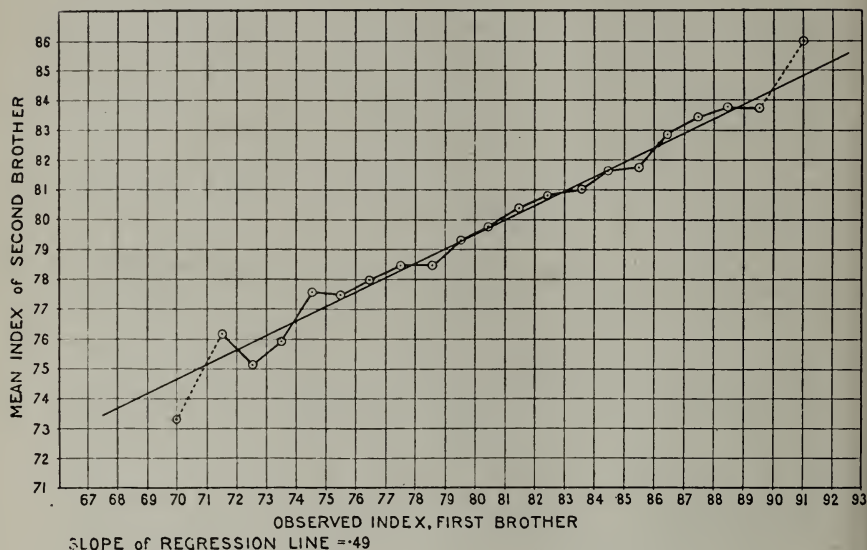


Diagram 1. Resemblance of Brothers in Cephalic Index.

Now we have learnt two great features of inheritance in man. First, that the points in Diagram 1, within the limits of observation, are on a line, and secondly, that the slope of this line is about .5. Are these results true for characters other than the cephalic index? Undoubtedly for all the physical characters yet worked out in man. . . . We cannot hesitate about the regression line being essentially linear. Has it for brethren usually a slope of about .5?

In Table 1 are given my observations on some 1000 families for adult brothers and sisters. You will see that the steepness of the regression line is essentially about .5.

Table 1.

INHERITANCE OF THE PHYSICAL CHARACTERS

Character	<i>Record of Adults</i>		Brothers and Sisters
	Brothers	Sisters	
Stature.....	.51	.54	.55
Span.....	.55	.56	.53
Cubit.....	.49	.51	.44
Eye Colour.....	.52	.45	.46
Mean.....	.52	.51	.49

In table 2³ are given my observations on the head measurements of school children. We note at once precisely the same convenient number .5.

I think we, therefore, may safely conclude that for the measurable physical characters in man, we have quite a definite regression line, and that it ascends 1 in 2. . . .

So far we have seen surprising uniformity in the inheritance of the measurable physical characters. How are we to extend our results to physical characters not capable of accurate measurement, and to psychical characters? Clearly the whole problem turns on this: Can we find the steepness or slope of this regression line without all the paraphernalia of the correlation table and the means of arrays? The answer is: Yes; providing we assume a certain distribution of frequency for the Gauss-Laplacian normal curve of deviations from the mean. Grant this distribution, and by very simple classifications indeed we can determine the steepness of the regression line. Now the problem before us is the following one: Is this assumption legitimate? It is certainly not true for organs and characters in *all* types of life. But it really does describe in a remarkable manner the distribution of most characters in mankind. We have shown that within the limits of random sampling, it is very true for a great variety of characters in the human skull. Dr. Macdonell has demonstrated it also for measurements on criminals, and you can be fairly convinced of its suitability by looking at one or two diagrams. . . . I should be the last to assert that no human characters can be found that do not diverge sensibly from this Gaussian distribution. But I believe they are few, and that for practical purposes we may with nearly absolute safety assume it as a first approximation to the actual state of affairs. This being once granted we can obtain the slope of our regression line by an exceedingly simple process. We can make a mere classification of the following kind, say, into boys with breadths of head below 145 mm., and boys with breadth of head above 145 mm. . . .

Now from such a division the mathematician can deduce the slope of the regression line on the assumption of normal distribution. Here, to give us confidence, are the results for head breadth and height in boys, which were worked out both ways:

³Omitted here.

Resemblance of Brothers

	Long table	Fourfold division
Head Breadth.....	.59	.58
Auricular Height.....	.55	.56

For practical purposes these results are identical. . . .

I now come to the fundamental idea of my comparison of the psychical and physical resemblance of brothers. Suppose we assume that moral and mental qualities in man, like the physical, follow a normal law of distribution, and that the regression is linear. What results shall we obtain by thus assuming perfect continuity between the physical and the psychical? No doubt the drums will begin to beat the tattoo, we shall hear talk of the hopeless materialism of some men of science. But to use Huxley's appropriate words: "One does not battle with drummers." I cannot free myself from the conception that underlying every psychical state there is a physical state, and from that conception follows at once the conclusion that there must be a close association between the succession or the recurrence of certain psychical states, which is what we judge mental and moral characteristics by, and an underlying physical confirmation be it of brain or liver. Hence I put to myself the problem as follows: Assume the fundamental laws of distribution which we know to hold for the physical characters in man, and see whither they lead us when applied to the psychical characteristics. They must: (a) Give us totally discordant results. If so, we shall conclude that these laws have no applications to the mental and moral attributes. Or, (b) Give us accordant results. If so, we may go a stage further, and ask how these results compare with those for the inheritance of the physical characters: are they more or less or equally subject to the influence of environment? Here are the questions before us. Let us examine how they are to be answered. As an illustration I take *Ability in Girls*. I measured intelligence by the following seven classes. (i) *Quick Intelligent*; (ii) *Intelligent*; (iii) *Slow Intelligent*; (iv) *Slow*; (v) *Slow Dull*; (vi) *Very Dull*; and a quite distinct category: (vii) *Inaccurate-Erratic*. . . .

My next stage was to ask two or three different teachers in several schools to apply the classification to 30 to 50 pupils known to each of them. The classifications were made quite independently, often by teachers of quite different subjects, and a comparison of the results showed that 80 to 85 per cent. of the children were put into the same classes by the different teachers, while about 10 per cent. more only differed by one class. This gave one very great confidence not only in the value of this scale, but of other psychical classifications when used by observant teachers. The next stage was to obtain exactly, as in the case of *Health*, a general scale of intelligence.

Diagram 11⁴ gives the normal distribution of intelligence in a population of 1014 girls. It is a curious, if a common result of experience, to find that

⁴Omitted here.

the modal ability is on the borderland between the *Intelligent* and *Slow Intelligent*. We have here for the first time a quantitative scale of intelligence, and we can at once apply it to the problem of the degree of resemblance between sisters as regards ability. Just as in the case of *Health*, all the girls of a given class are taken, say the *Slow Intelligents*, and at the average value of this class, is plotted upon this scale of intelligence, the average value of

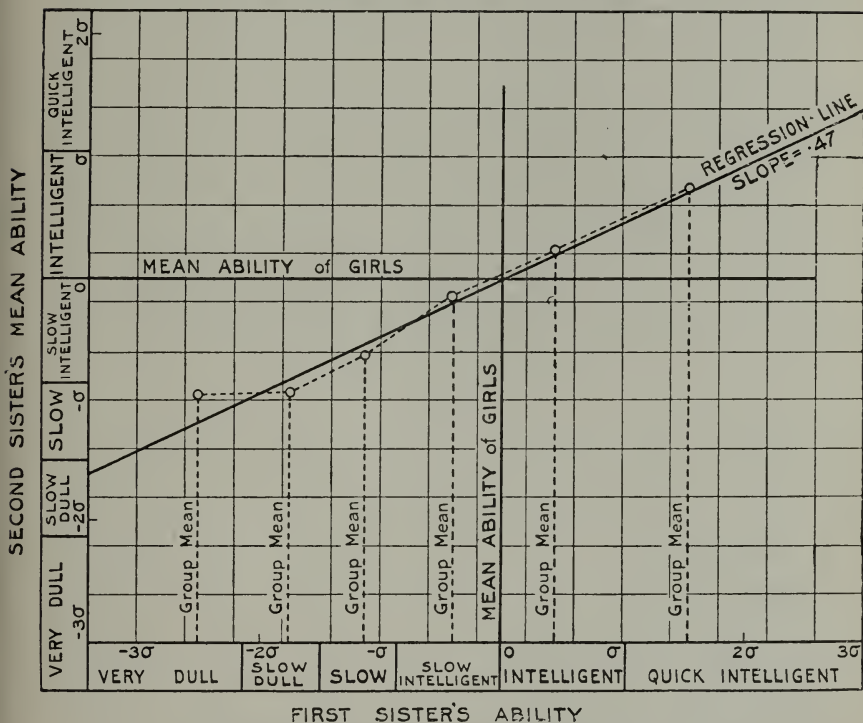


Diagram 12. Resemblance of Sisters in Ability.

the intelligence of the sisters of these girls on the same scale. We thus obtain the six points of Diagram 12, all well within the limits of random sampling, lying on the straight line found from the fourfold division of the data. The slope of this line is .47 or 47, close to 50, in the 100. There can, I think, be small doubt that *Intelligence* or *Ability* follows precisely the same laws of inheritance as *General Health*, and both the same laws as *Cephalic Index*, or any other physical character.

In precisely the manner indicated here all the other physical and psychical characters recorded may be dealt with. . . .

Thus far my whole object has been to describe the sources of my material, and to throw some light, perchance, on the new methods we have adopted in classification and computation. I have spent a considerable time over this latter topic, because to the anthropologist of the older school, the biometrician too often appears as a juggler in figures. It is impossible, perhaps, to help this at present, when the biometrician is introducing a new calculus, which cannot be learnt without hard work, and which cannot be handled without training. We are not endeavouring to discredit anthropology, but to furnish such branches of it as anthropometry and craniology with new tools—a little sharp-edged to the uninitiated who handle them incautiously—but which will raise anthropometry and craniology in the future into the more exact sciences. Such must be my excuse for describing so fully, and yet, I fear, so ineffectually, the processes we have adopted. It is another point to ask you to admit that I came to this inquiry without prejudice. I expected *a priori* to find the home environment largely affecting the resemblance in moral qualities of brothers and sisters. I expected to find a spurious emphasis of the inheritance of the moral qualities owing to this environment. Putting any thought of prejudice on one side, accept for a moment the methods adopted, and listen—regardless of the drummers—to the broad results of the inquiry. You have in Table 1 the mean of the resemblance in physical characters of brothers and sisters

Table 3

INHERITANCE OF THE PHYSICAL CHARACTERS

School Observations on Children

Character	Correlation		Brother and Sister
	Brothers	Sisters	
Health.....	.52	.51	.57
Eye Colour.....	.54	.52	.53
Hair Colour.....	.62	.57	.55
Hair Curliness.....	.50	.52	.52
Cephalic Index.....	.49	.54	.43
Head Length.....	.50	.43	.46
Head Breadth.....	.59	.62	.54
Head Height.....	.55	.52	.49
Mean.....	.54	.53	.51
Athletic Power.....	.72	.75	.49

from my records of family measurements. You have in Table 3 the mean of the physical measurements of our school records—16 series in the first, 24 series in the latter. I venture to say that remembering the possible slips in measurement and in classification, there is not the slightest doubt that those two series absolutely confirm each other, and give a mean degree of resemblance of

nearly .5 between children of the same parents for physical characters. How much of that physical resemblance is due to home environment? You might at once assert that size of head and size of body are influenced by nurture, food, and exercise. It is quite true; even curliness may be subject to home influences. But what is the broad effect of such environment on our co-efficients of heredity? Can any possible home influence be brought to bear on cephalic index, on hair colour, or eye colour? I fancy not, and yet these characters are within broad lines inherited exactly like the quantities directly capable of being influenced by nurture and exercise. I am compelled to conclude that the environmental influence on physical characters, however great in some cases, is not to the first approximation a great disturbing factor when we consider coefficients of fraternal resemblance in man. I do not believe it to be at all comparable with the irregularities that arise from random sampling and occasional carelessness in measurement or in appreciation of character.

Table 4

INHERITANCE OF THE MENTAL CHARACTERISTICS

School Observations on Children

Character	Correlation		
	Brothers	Sisters	Brother and Sister
Vivacity.....	.47	.43	.49
Assertiveness.....	.53	.44	.52
Introspection.....	.59	.47	.63
Popularity.....	.50	.57	.49
Conscientiousness.....	.59	.64	.63
Temper.....	.51	.49	.51
Ability.....	.46	.47	.44
Handwriting.....	.53	.56	.48
Mean.....	.52	.51	.52

Now turn to Table 4 of the degree of resemblance in the mental and moral characters. What do we find? Perhaps slightly more irregularity in the values than in the case of the physical characters. The judgment required is much finer; and the classification is much rougher. Let me frankly admit the difficulties of the task, both for observers and computers. I will lay no weight whatever, if you like, on the second place of decimals. But what is the obvious conclusion? Why, that the values of the co-efficient again cluster round .5. If anything the average degree of resemblance for the psychical is rather less than for the physical, it certainly is not greater. Personally I would lay not a grain's weight on the difference. : . .

It has been suggested that this resemblance in the psychical characters is compounded of two factors, inheritance on the one hand and training or environment on the other. If so, you must admit that inheritance and environment make up the resemblance in the physical characters. Now these two sorts of resemblance being of the same intensity, either the environmental influence is the same in both cases, or it is not. If it is the same, we are forced to the conclusion that it is insensible, for it cannot influence eye colour. If it is not the same, then it would be a most marvellous thing, that with varying degrees of inheritance, some mysterious force always modifies the extent of home influence, until the resemblance of brothers or sisters is brought sensibly up to the same intensity! Occam's razor will enable us at once to cut off such a theory. We are forced, I think literally forced, to the general conclusion that the physical and psychical characters in man are inherited within broad lines in the same manner, and with the same intensity. The average home environment, the average parental influence is in itself part of the heritage of the stock and not an extraneous and additional factor emphasising the resemblance between children from the same home.

But we are not yet at the end of our conclusions. By assuming our normal distribution for the psychical characters we have found, not only self-consistent results—linear regression, for example, as in the case of the inheritance of intelligence, but we have found the *same* degree of resemblance between physical and psychical characters. That *sameness* surely involves something additional. *It involves a like heritage from parents.* The degree of resemblance between children and parents for the physical characters in man may be applied to the degree of resemblance between children and parents for psychical characters. We inherit our parents' tempers, our parents' conscientiousness, shyness and ability, even as we inherit their stature, forearm and span.

At what rate is that? I show you a table . . . which represents our present knowledge of parental inheritance in man, and in other species. I venture to say that—within broad lines—the physical characters are inherited at the same rate in man and in the lower forms of life. The resemblance of parent and offspring is again roughly .5.

What conclusion flows upon us irresistibly from the inspection of such a table? Why, that the physical characters are not features, which differentiate man from the lower types of life. If they are inherited like man's physical characters, if they are inherited even as the protopodite of the water flea, what reason is there for demanding a special evolution for man's mental and moral side? We look upon the universe and wonder. The man of science probes a little deeper into nature than the ordinary mortal, but the deeper he probes, the greater his wonder, for the more complex and mysterious the universe appears. Do you wish to draw the line of mystery at living forms? Look at the sky on a clear night, and realise that while astronomers have *described* the motions of a tiny corner of the universe, they have not the least explanation of how and why those motions are taking place. . . .

But I would not leave you with a mere general declaration that all is mystery, that scientific ignorance of the ultimate is profound. Rather I would emphasize what I have endeavored to show you to-night, that the mission of science is not to explain but to bring all things, as far as we are able, under a common law. Science gives no real explanation, but provides comprehensive description. In the narrower field it has to study how its general conceptions bear on the comfort and happiness of man. Herein, I think, lies especially the coming function of anthropology. Anthropology has in the first place to study man, to discover the sequence of his evolution from his present comparative stages and from his past history. But it cannot halt here; it must suggest how those laws can be applied to render our own human society both more stable and more efficient. In this function it becomes at least the handmaiden of statecraft, if indeed it were not truer to call it the preceptor of statesmen.

If the conclusion we have reached to-night be substantially a true one, and for my part I cannot for a moment doubt that it is so, then what is its lesson for us as a community? Why simply that geniality and probity and ability may be fostered indeed by some home environment and by provision of good schools and well equipped institutions for research, but that their origin, like health and muscle, is deeper down than these things. They are bred and not created. That good stock breeds good stock is a commonplace of every farmer; that the strong man and woman have healthy children is widely recognized too. But we have left the moral and mental faculties as qualities for which we can provide amply by home environment and sound education. . . .

Do not let me close with too gloomy a note. I do not merely state our lack. I have striven by a study of the inheritance of the mental and moral characters in man to see how it arises, and to know the real source of an evil is half-way to finding a remedy. That remedy lies first in getting the intellectual section of our nation to realize that intelligence can be aided and be trained, but no training or education can *create* it. You must breed it, that is the broad result for statecraft which flows from the equality in inheritance of the psychical and the physical characters in man.

15. THE DEVELOPMENT OF RACE MEASUREMENTS AND CLASSIFICATION¹

By GUSTAV RETZIUS

The first scientist who found place in the natural system for human beings was . . . Linnaeus, the Swedish naturalist. He was also the first to subdivide human beings into distinct zoological categories. Men, he says, form one species, but among them are to be found several varieties. He differentiated four, one in each of the continents then known, characterizing them principally by the colours of their skins: *Americanus rufus*, *Europaeus albus*, *Asiaticus luridus*, *Afer niger*. He also gave a category which he named, *monstrosus*, embracing certain varieties of an abnormal type with which he was not [personally] acquainted. The people living in Polynesia were wholly unknown to him. As for the white man, *Europaeus*, the description he gives of him shows that he was only familiar with that section of Europeans living in the northern parts of the continent. Linnaeus himself had not extended his foreign travels beyond Northern Germany, Holland, Northern France, and England. Thus, when he defines his *Europaeus* as: "*Albus, Sanguineus, Torosus, Pilis Flavescentibus, Prolixis, Oculis Caeruleis*," the characterization, especially in the last item, does not, generally speaking, suit the population of the whole of Europe, but rather only that of its northern districts, i.e., the peoples usually classed as belonging to the Teutonic family; the Scandinavians, and the inhabitants of Holland, England, and the northern parts of Germany and France. Linnaeus himself, however, undoubtedly included the peoples of Europe in general under his *Europaeus*, differentiating them as a whole from the varieties of *Homo sapiens* to be met with in Asia, Africa, and America. . . . His "*homines Alpini*," it must be observed, are classified in the imagined group "*Homo Monstrosus*," along with "*Monorchides, Macrocephali, Plagiocephali*," i.e., forms of a more or less abnormal character, his knowledge of which was probably derived from the works of other writers or from hearsay evidence. . . . Moreover, I have personally investigated all the different editions of Linnaeus' *Systema Naturae* as well as the hitherto unprinted notes taken by his pupils during his lectures and have come to the definite conclusion that he only assumed that there is one variety of *Homo*

¹From Gustav Retzius, "A Review of, and Views on, the Development of some Anthropological Questions" (Huxley lecture for 1909), *Journal of the [Royal] Anthropological Institute [of Great Britain and Ireland]*, Volume 39, pages 279-295, 1909.

sapiens in Europe, viz.: Europaeus, but that he described that variety in accordance with the observations he had made personally in intercourse with those around him in his native country and in other parts of Northern Europe, and that he placed this variety side by side with those of the other continents: Africa's black variety, Asia's yellow variety, and America's red variety. . . .

Blumenbach, the German anatomist, was the first to enter upon the investigation of the human race in a serious manner from the standpoint of a natural scientist, and to study its different varieties comprehensively and exhaustively. His subdivision, like that of Linnaeus, was in accordance with the continents and with the colour of the skin and hair. He, however, noted for the first time variations in the *shape of the skull and the face*. Blumenbach added one more to the four principal varieties into which Linnaeus divided Homo sapiens, this fifth variety, which was unknown to Linnaeus, being located in the islands of the Pacific. Blumenbach's names for his five varieties were, we may remember: the Caucasian, the Mongolian, the Ethiopian, the American, and the Malayan. The Caucasian embraced all the peoples of Europe except the Finns and the Lapps, but also included the peoples of Western Asia as far as the River Ob, the Caspian Sea, and the Ganges, and also the inhabitants of Northern Africa. This variety was characterized as possessed of *white skins, red cheeks, brown or nut-brown hair, rounded skulls, oval face, slightly arched and rather slender noses, small mouths, perpendicular front teeth, and as not having big lips*.

The only peoples in Europe Blumenbach did not classify in this group, viz.: the Finns and Lapps, he placed among the Mongolians.

Blumenbach published his characterization of the five varieties of the human race in his well-known work, *De generis humani varietate nativa* (ed. 1, 1775; ed. 3, 1795). It is very clear from several remarks he makes, that he was concerned with the *shape of the skull* as well as with the colour of the hair and the skin. . . . Blumenbach took into consideration. . . especially its length and breadth, its sincipital aspect (which he calls its *norma verticalis*) and . . . he distinguished between "the square shape" characteristic of the Mongols, and the "pressed-in-from-the-sides form," as found in Negroes. . . . In his anatomical museum at Göttingen he had a fairly large collection—for that time—of human skulls, containing representatives of even very distant regions of the earth. . . . One can perceive that Blumenbach concentrated his attention, in his craniological researches, primarily upon the physiognomical elements in the appearance of the cranium and especially of the forehead and the other parts of the face, i.e., upon the typical features of the physiognomy. A confirmation of this may be found in the circumstance that, so far as is known, he never, or practically never, carried out measurements of the crania, either in his investigations or when he was describing the differences of shape in the crania he had collected. The most remarkable evidence, however, of Blumenbach's not having grasped and appreciated the real value of the *norma verticalis* of the crania, and especially the importance of the ratio existing

between the length and the breadth of the skull, lies in the fact that he included in one or other of his five varieties peoples whose sincipital aspects, and especially also the indices of length and breadth, are exceedingly different one from another. To take for an example: he placed in his Mongolian variety Lapps and Eskimos, races of men that are very divergent as far as the shape of the cranium, especially their length and breadth relation, is concerned. In the Caucasian group, too, he collected a number of peoples whose crania show very marked differences one from another. It is very remarkable, moreover, that he selected the name Caucasian as suitable for the peoples of Europe, with the Caucasus and its round-headed population as the central point. . . . It is quite clear that Blumenbach has the merit, as above stated, of being the first to make a serious and extensive study of the form of the crania of the different races of mankind, but he appears to have been fettered by his absolute belief in the uniformity of his five varieties, and he neglected to observe that within them there are assembled races, whose crania-forms are so typically different, that these races cannot be brought together in the system. It seems singular to us that, although he was a thorough naturalist, he should have classed together such widely separated races as Lapps and Eskimos, to confine ourselves to that one striking example already adduced. It would seem that his attention had become closely fixed upon the physiognomical character of the facial features of the crania, as indeed is plainly apparent from a study of the *Decades*, his principal work on the crania. If, in pursuing his investigations, he had made use of his *normae*, and especially his *norma verticalis*, he might have advanced science more than he really did. Blumenbach has the merit of having introduced into the science of anthropology the study of the form of the skulls—he is the real founder of Craniology.

In the year of Blumenbach's decease, 1840, Anders Retzius, the Swedish anatomist, laid before the Academy of Sciences in Stockholm the first draft of his theory regarding the shape of the crania, and in 1842 he lectured on "The Form of the Skulls of the Northern Peoples of Europe" to an assembly of Scandinavian natural scientists in Stockholm. That lecture was subsequently translated and published in Holland, France, and Germany. It aroused no little attention in the scientific world, for it brought forward new suggestions and new points of view.

Up to then it had been usual to regard each of the varieties, into which the human race had been subdivided by Linnaeus and Blumenbach, as essentially uniform. Anders Retzius, however, now showed, as a result of his unprejudiced and accurate investigation of the forms of crania upon which Blumenbach principally founded his theory, that not even the Caucasian variety, established as a unit by Blumenbach, was uniform throughout; that it indeed, on the contrary, included races of men possessed of very different forms of the skull. He not only proved that the Lapps, Finns, and Eskimos, whom Blumenbach brought together and placed in the Mongolian variety have crania so widely differing from each other, that they cannot possibly belong to one

and the same variety, but also that the proper inhabitants of Scandinavia, i.e., the Swedes, Danes, and Norwegians, differ materially in the shape of the cranium from the inhabitants of Russia, and from the other peoples related to them, i.e., the Slavs.

The skull of the Scandinavian is narrow and more extended backwards, and when looked at from above is more or less oval in outline; that of the Slavs on the other hand is broader, shorter, and when seen from above is more or less round in outline or squarer. The peoples with the longer shape of the cranium Anders Retzius called *Gentes Dolichocephalae*, those with the shorter *Gentes Brachycephalae*. In arriving at his conclusions he made use of *measurements* of the crania in various directions. For the ratio between the measurements of maximum length and maximum breadth of cranium he adopted 1000:x. In Swedes the ratio of length to breadth was found to be 1000:773, in Slavs 1000:888, etc. Anders Retzius had thus given the initiative to the index-measurement system which has since played so important a part in anthropology.

In the following years, until his death in 1860, there appeared a succession of treatises and reports, in which he placed on record the results of his continued investigations, and in them he made it abundantly evident that the relation between the length and the breadth of the cranium forms one of the most important criteria for race distinctions that those engaged in making a comparative study of the races of mankind can employ. He tried to group the peoples both in and beyond Europe by the aid of this relation, but it was not by any means his idea thereby to establish any sort of "system of the races of mankind," as is mistakenly supposed by some. In his works Anders Retzius spoke of the classification as merely an attempt to arrange the forms of crania. He was able to show that dolichocephaly and brachycephaly are to be found all the world over, except in Africa, but he was not able, any more than those who have taken up the question subsequently have proved able, to explain the real purport of the phenomenon or how it has arisen. This difficulty of arriving at the explanation of the ultimate cause of a phenomenon is, as we know, characteristic in fact of all the phenomena we meet with in Nature. Research enables us to reveal their existence, to describe and register them, but it is rare indeed that we are enabled to discover their origin and cause. That is the case, too, with the majority of the other race-characters. We are aware that the Negro's skin is black, the Indian's red, the Mongolian's yellow, and the European's more or less white. But has anyone ever been able to demonstrate why the colouring is so varied in the skins of these different races? The same difficulty arises when an explanation is required of the differences in the colour and character of the hair, the colour of the iris, the stature or length of the body, etc. It is therefore essential for us to rest content with having established the fact, that dolichocephaly and brachycephaly are to be found disseminated throughout Europe, Asia, Polynesia, and America, not, however, merely promiscuously without rule, but existing

as a criterion of race for the different peoples inhabiting those regions of the globe.

Anders Retzius did not lay down any definite figures by way of limit to mark off dolichocephaly from brachycephaly. He had come across intermediary forms between the two varieties, and he seems to have thought it best to adopt a central point as characteristic for each. Thus, he states that the length of the head of the dolichocephali exceeds the breadth by about one-fourth of the length, i. e., the length stands to the breadth in the ratio of 100:75, whereas the ratio for the brachycephali is 100:80-87, i. e., the length exceeds the breadth by one-fifth to one-eighth.

From the account given by Anders Retzius we may see in general that he did not regard dolichocephaly and brachycephaly as merely a matter of measurement and nothing more, but looked upon them rather as a typological character, a ratio indicative of form, possessing a very close relationship to other criteria of form, which he also described in several of his works.

That he paid attention in his researches, not only to the shape of the skull itself but also to the parts of the face, is evident from two circumstances, first, that in his classification he registers the greater or less degree with which the jaws project, their orthognathic and prognathic properties; and, second, that he gives the dimensions of the face (height of face, jugular breadth) both in his series of measurements and in his descriptions of the characters of the face.

It is not my intention, however, here to enter upon a further discussion of this phase in the history of anthropology. I have only desired to bring forward some of its salient points, seeing that they are of fundamental importance for us in seeking to arrive at a clear idea of the history of the race question even as regards Europe alone. In accordance with the theory of Linnaeus and Blumenbach it was generally supposed, as has been stated above, that the white, European, variety of the human race—Blumenbach's Caucasian variety—consisted of a uniform group of people more or less homogeneous among themselves. The idea put forth by Anders Retzius first directed attention to the existence of considerable divergences of race even within the white variety, i. e., among the peoples of Europe itself. The Swedish anatomist and anthropologist demonstrated that the skull of a Swede and that of any other representative of the same stem, the so-called Teutonic stem, differ very widely not only from those of the Lapp and the Finn but also from that of the Russian, and broadly speaking, from that of a Slav. Anders Retzius laid strong stress, consequently, upon the fact that languages do not afford any certain guide for determining criteria of race. As early as 1847 he expressed himself as follows in one of the publications that issued from his pen: "The whole of mankind belongs to one species; the varied types are varieties of several different grades, which, in many localities, have become hybridised one with another. In most countries more than one type of nationality is to be found naturalized; thus in many countries migrations of people have taken place,

small sections of the tribes previously dwelling there still remaining distributed—though sparsely—among the more numerous newcomers. In several countries the people who thus remained adopted the language of the tribe that won its way in amongst them; that is said to have been the case in North Germany, where the population, originally Slavs, adopted German as their language in course of time, and by degrees, through acquiring familiarity with German ways and customs, became thoroughly amalgamated with the German nation. Similar conditions have produced the same results in many other regions both in the New and Old Worlds. . . .”

There remains, however, one more criterion of race to be mentioned, stature or length of body. This has, indeed, for a long time past been a point to which anthropologists have been attentive, and in the tabulated measurements of the recruits for the army they have been provided with material ready to hand for purposes of investigation. It was not, however, until towards the close of last century, when several special inquiries on a large scale were carried out in different European countries, that this character came by its rights and received due attention and notice.

Thanks to the systematic investigations made by fully competent persons regarding the most important anthropological characters of large army contingents, the distribution and numerical amount of these several characters have at last been made known for some of the nations of Europe, especially by Dr. Otto Ammon in Baden in 1886–1899 and by Dr. Rid. Livi in 1896–1905. . . .

There are five principal characters that were made the subject of inquiry:

1. The length and breadth of the head, and consequently the length and breadth index;
2. The form of the face;
3. The stature or length of the body;
4. The colour of the hair of the head;
5. The colour of the iris. . . .

In conjunction with a number of more or less exhaustive investigations into certain of these characters for . . . the countries of Europe, such a general knowledge of the race-characteristics of the European nations has been obtained, that it has been considered possible to draw some general conclusions. Professor Ripley of Harvard University, and Dr. Deniker, of Paris, have been specially occupied with summarizing the general results of investigations in this department. The former gives three separate races called by him: “The Teutonic Race,” “The Alpine Race,” and “The Mediterranean Race.” . . . Dr. Deniker, on the other hand, went further in his subdivision of races; besides the three named he added some others, but has on different occasions arrived at different results. In his last publication, however, in the Huxley Memorial Lecture of 1904, Dr. Deniker fixed the number of European races at six. . . . Until a thorough investigation has made matters clearer,

it seems to me to be wisest only to admit of the existence of such races as have really been proved, and to leave the classification of the remainder to the future.

The following may, however, be admitted as surely existing:

1. The Northern European Dolichocephalic, Blue-eyed, Tall Race (Anders Retzius' Dolichocephalic Germanic type), which latterly has been designated by several writers (Wilson and others) *Homo Europaeus* (the term Linnaeus used), and which is now often termed the Northern Race (La Race Nordique, Nordische Rasse).

2. The Middle-European Brachycephalic, Dark-haired, Dark-eyed, Short-statured Race, probably closely related to the similar population in the eastern portions of Europe (Anders Retzius' Slavonic and Rhaetian people). This race has been designated recently *Homo Alpinus* (Linnaeus' term); there may be some justification for this term in the fact of a large section of the race being resident in the Alpine regions of Southern and Central Europe. But it should not be forgotten that this race during the lapse of centuries has extended its habitat to a considerable part of France and even to a large portion of Central and Northern Germany. Linnaeus certainly did not mean this race by his term "*Homo Alpinus*," a fact already stated above.

3. The South-European Dolichocephalic, Dark-haired, Dark-eyed, Short-statured Race, called *Homo Mediterraneus* (Sergi, Ripley, Wilser, and others), which may possibly embrace variations of distinct character in the various Mediterranean countries.

To name only the first of these three races, Europeans, as appears often to be the fashion nowadays, seems to be very strange, since the other two great races, too, have inhabited Europe from times immemorial, and it is by no means possible of proof that they originated in other Continents and migrated into Europe subsequently. I consider, moreover, that it is an entirely incorrect use of the nomenclature established once for all for zoology, to call these races "*Homo Europaeus*," "*Homo Alpinus*," "*Homo Mediterraneus*," as is so often done in modern anthropological literature. This leads to a confusion of our ideas about *species*. They can, of course, only be regarded as variations of one and the same species, *Homo sapiens*, and in reality only as sub-variations of a variety, viz., the so-called white race of men. It is unfortunate that the notions, *species*, *variety*, and *race*, have not been more definitely fixed in value as regards the races of mankind. The majority of anthropologists are probably of the same opinion as Linnaeus, that the living races of mankind at the present time are all to be referred to one species, *Homo sapiens* Lin., and that their variant representatives are to be regarded as varieties of the species, even though very weighty reasons might be alleged for regarding some of these variations as *species themselves*. This question has now lost much of its significance since the triumphs of the theory of descent, but it is of importance for systemology, and for the formation of terms. As

regards the population of our own continent and the problems concerning them, it is of no great significance whether the white man, the European, is put down as a particular *species* or as a variety. But it is of real importance that its *subsections* should not be put down as separate *species*. For my own part, I am at present most inclined to agree with Linnaeus and Blumenbach in regarding the great racial groups of the human species as varieties, though it must be admitted that the Australian, the Negro, and the American differ very widely from the European. There are to be found, however, remarkable transitional (intermediary) forms to bridge the gulf between the peoples of Asia and Europe, and there also exist similar transitional forms uniting the people of Asia with those of America and a portion of Polynesia. But if the term *variety* is to be preserved for the various large race-groups, we require a suitable term for the sub-sections under *Varietas*. . . . It seems to me, therefore, to be indicated that these sub-sections of the varieties should be designated as *sub-varieties* or *sub-races* (race branches).

16. MEASUREMENTS OF MEN¹

By J. DENIKER

STATURE

Of all the physical characters which serve to distinguish races, stature is perhaps that which has been regarded as eminently variable. Not only does stature change with age and sex, but it varies also under the influence of external agencies. These variations are unquestionable; but it must be remarked that they occur in a similar way in all races, and cannot exceed certain limits imposed by race. . . .

The individual limits between which height varies are wide. It is generally admitted that the limits of height in the normal man may vary from 1.25 m. (4 ft. 1) to 1.99 m. (6 ft. 6 $\frac{3}{4}$). Below 1.25 m. begins a certain abnormal state, often pathological, called Dwarfism. Above 2 m. we have a corresponding state called Giantism. Dwarfs may be only 38 cm. (15 in.) tall, like the little feminine dwarf Hilany Agyba of Sinai, and giants as high as 2.83 m. (9 ft. 5), like the Finn Caianus. . . .

Extreme statures which are still called normal, those below 1.25 m. and above 1.99 m., are very rare. Even statures below 1.35 m. and above 1.90 m. are exceptions. Thus in the extensive statistics from the American Civil War, based on more than 300,000 subjects, but one giant (above 2 m.) was met with out of every 10,000 subjects examined, and hardly five individuals in 1000 were taller than 1.90 m. (6 ft. 3). Again, in the statistics of the Committee of the British Association, which cover 8,585 persons, only three individuals in a thousand were found taller than 1.90 m. Yet in these two cases populations of a very high stature (1.72 m. on the average) were being dealt with. If we turn to a population lower in stature, for instance the Italians, we find only one adult male who is 1.90 m. or more in height among each 7000 examined, according to the statistics of Pagliani. In the same way, statures under 1.35 m. (53 in.) are met with only once in every 100,000 cases among the men examined by the American commission; and not once among the 8,585 British. Even in a short statured population like the Italians only three

¹Selected from pages 25 to 104 of J. Deniker, *The Races of Man*, London, 1901. Originally written in French. The order of the parts has been slightly rearranged to give greater coherence to the present extract, and the style of the translation has been somewhat freely handled; but no alterations or additions of substance have been made.

such are to be found in every 1000 males examined. We do not possess sufficient data to be able to affirm positively that these extreme statures are equally exceptional among every one of the peoples of the globe. But all we know leads us to suppose that they are exceptional, and that the limits of normal stature in man may therefore be set between 1.35 m. and 1.90 m.

However, individual cases are much less important than *averages* of different peoples; that is to say, the height obtained by dividing the sum of the statures of the individuals by the number of individuals measured. On comparison of these averages, it becomes possible to form a clear idea of racial differences in bodily height.

I have brought together in a table the average statures of peoples from whom we have series of measurements of twenty-five or more individuals. . . . An examination of this table shows that the extreme averages of different populations fluctuate, in round numbers, from 1.38 m. (4 ft. 6) among the Negrillo Akka to 1.79 m. (5 ft. 10½) among the Galloway Scots. But if we set aside the quite exceptional pigmy tribe of the Akka, as well as the Galloway Scots, and even the northern Scots in general (1.78 m.) who likewise form a group entirely apart, we find that the extreme limits of stature vary from 1465 mm. among the Negritos of the Philippines to 1746 mm. among the Scots as a whole. Speaking broadly, then, we may recognize statures of 1.46 m. (4 ft. 9½) and 1.75 m. (5 ft. 9) as the extremes of human racial averages. The medium between these extremes is 1.61 m.; but if we leave out of account the rather exceptional Negritos, we note that the remainder of mankind presents statures which ascend almost uninterruptedly by degrees of millimetres from 1.54 m. to 1.75 m. These figures make the average 1.65 m. (5 ft. 5); as Topinard recognized. Topinard likewise proposed the division of statures into four classes which have been generally adopted. These are: short, less than 1.60 m.; below average, between 1.60 m. and 1.65 m.; above average, between 1.65 m. and 1.70 m.; tall, 1.70 m. and over. In English measure, these figures correspond almost exactly to under 5 ft. 3 in.; from 5 ft. 3 to 5 in.; from 5 ft. 5 to 7 in.; 5 ft. 7 and up.

The table also shows that there are many more populations—almost twice as many, in fact—whose stature is merely above or below average, than peoples of a decisively tall or short stature. That is, more races, nations, and tribes average between 5 ft. 3 and 5 ft. 7 in height than above and below these figures.

What is the influence of environment on stature? Since the time of Villemé the assertion has been repeatedly made that well-being favored and hardship stunted growth. There certainly are facts which seem to prove this. Well-fed upper classes possess a higher stature than the lower classes; thus, the English of the liberal professions are 69.14 in. (1757 m.) in height, the workmen of the same nation only 65.7 in. (1705 m.). . . .

HAIR

That one of the horny products of the skin which is most important for the classification of races, is undoubtedly the hair of the head and body. The general structure and number of the hairs—there are about 260 to each square centimetre—hardly show any difference between race and race. On the other hand, the length of the head hair, the proportions of this length in the sexes, the nature or texture of the hair, its transverse section, form, and color, vary greatly according to race. . . .

Hair texture.—Four principal varieties of hair are usually distinguished according to their aspect and texture—straight, wavy, frizzy, and woolly. It is easy to form a clear picture of these varieties at first sight; but careful examination shows that the differences are deeper, and best brought out by . . . microscopic examination of transverse sections. . . . If we calculate the index or percentage relation of the breadth to the length of the cross-sectioned hair in a great number of cases, we obtain satisfactory results, as Topinard and Ranke have shown in general for the Japanese, and Montano for the races of the Malay Archipelago. . . .

Straight hair gives a circular section, while that from woolly hair has the form of a lengthened ellipse. This ellipse is less extended, a little more filled out, in the sections of wavy hair. If the major axis of the ellipse be supposed to equal 100, the minor axis will be represented by figures varying from 40 to 50 for the woolly hair of the Bushmen and Hottentots, from 50 to 60 for that of the Negroes, while the straight hair of the Eskimo will have this axis equaling 77, that of the Tibetans 80, of the Japanese 85. The hair of Europeans yields an oval in which the minor axis is from 62 to 72 percent of the major, according to Topinard. It may be said with certainty, since the studies of Unna, that the woolly hair of the Negro rolls up into a compact spiral precisely because of the flatness of its elliptical section. . . .

A certain correlation appears to exist between the texture of the hair and its absolute and relative length. Thus, straight hair, as of the Chinese and American Indians, is at the same time the longest, while woolly hair is shortest—from 5 to 15 centimetres. Wavy hair occupies an intermediate position. Moreover, the difference between the length of the hair of men and women is almost inappreciable in the two extreme divisions. In some straight-haired races the head hair is as long in men as in women; one need but to call to mind the queue of the Chinese, or the beautiful heads of hair of the Indians, which occasionally attain a length of as much as 2 metres. In frizzy-haired races, on the contrary, the hair of the head is equally short in the two sexes; women's hair among the Bushmen, Hottentots, and even Negroes is not appreciably longer than that of men. It is only in the wavy and in part the frizzy haired classes that the sex difference becomes notable. With European men the length of the hair rarely exceeds 30 or 40 centimetres, while with the women it averages 65 to 75 centimetres, and may attain in exceptional cases to 2 metres.

Hairiness.—Another fact to be noted is that the general development of the pilous system on the face, as on the rest of the body, seems to be related to the texture of the head hair. Straight-haired races are ordinarily very glabrous, the men having a rudimentary or scanty beard, as among the American Indians, Mongols, and Malays. In the wavy or frizzy-haired races, the development of the pilous system is considerable: witness the Australians, Dravidians, Iranians, Ainus, Europeans. Only the woolly-haired races are not to be included in the rule: glabrous types like the Bushmen, and most of the western Negroes are found side by side with rather hairy types such as the Melanesians, Ashanti, and pigmy Akka. . . .

Even baldness results largely from the nature of the hair. According to Gould, baldness is ten times less frequent among Negroes than among Whites between 33 years and 44 years, and thirty times less so between 21 and 32. Among mulattos it is more frequent than among Negroes, but less than among Whites. Among American Indians it seems to be still rarer than among Negroes. White hair follows almost the same rule. . . .

CRANIAL CAPACITY

The cranium or skull forms the object of investigation of an extended branch of anthropology called craniology. . . . First in order of importance comes cranial capacity, or the volume of the cavity of the brain-case, which gives an idea of the volume of the brain, and approximately of its weight.

Cranial capacity may vary to double the minimum figure—from 1100 to 2200 cubic centimetres—among normal individuals in the human race. The average capacity for the races of Europe is from 1500 to 1600 c. c.; that of the skulls of Asiatic races appears to be very nearly the same; that of the Negro races and Oceanians a little smaller, perhaps from 1400 to 1500 c. c. on the average. That of the Australians, Bushmen, and Andaman Islanders is still less, from 1250 to 1350 c. c. But it must not be forgotten that the volume of the head, like certain of its dimensions, bears some relation to the height of the individual; and indeed the small-headed Bushmen and Andaman Islanders are very short in stature, although the Australians are of average height.

The difference between the volume of the cranium in man and in woman must probably also be attributed to their difference in height. According to the race examined, this sex difference ranges from 100 to 200, and even more, in favor of man. The cranial capacity of woman represents from eighty-five to ninety-five percent of the cranial capacity of man. The cranial capacity of lunatics, of certain criminals, and especially of celebrated or distinguished scholars, artists, and statesmen, appears to be slightly superior to the average of their race. We shall revert later to the question of cranial capacity in connection with weight of brain.

HEAD FORM

The general form of the brain-case is an oval, but this oval may be more or less rounded, quite globular, or more or less elongated into an ellipse the major axis of which is almost double the minor. The numerical expression of the cranial form is given in anthropology by what is called the *cephalic index*. This is the proportion or relation of the length of the cranium (ordinarily measured from the glabella between the eyebrows to the most distant point of the back of the skull) to its greatest breadth. Reducing the length uniformly to 100, we obtain different figures for the breadth, which express the cranial form. Thus very round skulls have 85, 90, and even 100 for their index, while elongated skulls may have an index of 70, 65, or even 58. According to Broca's nomenclature, skulls having indices between 77.7 and 80 are mesaticephalic or mesocephalic; those having an index below this figure are sub-dolichocephalic (down to 75), or dolichocephalic (below 75); those which have an index above 80 are sub-brachycephalic (up to 83.3), or brachycephalic (above 83.3).² . . .

Measurements taken on the head of the living subject can never be as accurate as those obtained on the skull; but on the other hand they may be much more numerous, and the greater number of observations largely compensates for errors due to technical difficulties in the mode of measuring. Further, in the measurement of heads of living subjects, there is the advantage of sex, approximate age, and exact origin being known, while for perhaps every other skull that the anthropologist is able to examine, one or more of these particulars may be wanting. These circumstances explain why, in these latter days, the attention of anthropologists is directed towards measurements of living subjects, among which those of the head occupy a foremost place.

Do the measurements of the head of the living subject correspond to the measurements of the skull? . . . The principal measurement, the cephalic index, does not appear to be exactly identical on the skull and on the head of the living. Theoretically, the living head should have its index a little higher than the skull, the muscles of the temporal region being thicker than those of the back and front region. However, experiments made in this connection are somewhat contradictory in detail. According to Broca, two units must be subtracted from the index taken on the living subject in order to obtain the index on the skull. This is also the opinion of Stieda and Houzé and a great number of anthropologists; whereas Mantegazza and Weisbach advocate the reduction of the index by three units; and Virchow and Topinard do not admit any. . . . However, in a general way one may allow a difference of two percent between the indices of the skull and the living head. In this way the

²The system now more commonly followed reckons heads with an index below 75 as dolichocephalic or long, above 80 as brachycephalic or broad, between 75 and 80 as mesocephalic (mesaticephalic) or medium. Note that low figures denote the longest heads.—*Ed.*

two may be compared: one adds two units to the index of skulls and subtracts two from the index of the living subject. . . .

The differences of cephalic index according to sex are insignificant. According to my personal researches, this difference on the average hardly exceeds 0.7 in the living subject and 1.5 in the cranium; and even this latter figure may be exaggerated. Roundly, it may be said that the difference between the cephalic index of men and women hardly exceeds one unit—that is to say, it is no greater than the degree of personal error in making observations. . . .

Has the form of the head, so far as the cephalic index can express it, an influence on the volume of the brain, and consequently on its weight, and even perhaps on mentality? This question is subordinate to another, namely: To what point is the weight of the brain the expression of the psychical value of this organ? We shall see further on that brain weight can only be considered as a very rough approximation to the degree of mentality. But even if we should allow to brain weight the exaggerated importance that was formerly attributed to it, we must admit that brain weight does not stand in any fixed relation with the shape of the skull. The only investigation made into this matter—that of Calori— . . . shows that among Italian men the brachycephalic have on the average 27 grams of brain more than the dolichocephalic, while among Italian women it is the dolichocephalic who have the better of the brachycephalic by 21 grams. The differences in the two shapes being so very trifling, one may consider oneself equally intelligent whether dolichocephalic or brachycephalic. . . .

THE NOSE

The skeleton of the nose presents numerous variations according to race. The nasal bones may be more or less inclined in relation to one another, so as to form either an almost flat plane or a sort of prominent roof; their profile may be straight, concave, or convex; their breadth and their length also vary. The form of these bones, together with the nasal opening below, may be expressed by the nasal index—that is to say, the relation between the height of the bony mass and its breadth. According to the greater or lesser breadth of the nasal bones and of the nasal opening, the skull is called leptorhinian (long-nosed) or platyrhinian (flat-nosed); the intermediate forms bear the name of mesorhinian. The form of the nasal opening appears to be transmitted very tenaciously by heredity.

A table, in which I have introduced only series of more than ten skulls, gives the distribution of the principal ethnic groups according to their nasal index. It is easy to see in running the eye over this table that almost all the populations of the so-called white races are leptorhinians, while all the yellow populations are comprised exclusively in the group of mesorhinians, and Negroes and Bushmen in that of the platyrhinians. . . .

The nose of the living, by the variety and the fixity of its forms, also presents one of the best characters for distinguishing races. We can express by means of the nasal index of Broca the proportion of its width (measured by just touching with the calipers the outermost surfaces of the nostrils) to the total length of the nose (from the root to the lowest portion of the septum) which is taken as equaling 100. This index varies in the living subject more widely than on the skull, namely from 40 to 120 according to race. Among the platyrhinians or broad-nosed, the breadth of the nose exceeds 85 percent of the length; among the leptorhinians, it is less than 70; among the mesorhinians, it lies between 70 and 85. . . .

PROGNATHISM

Prognathism, that is to say the degree of projection of the maxillary portion of the face, namely the upper and lower jaws, is a characteristic trait of certain skulls; however, it does not seem to play so important a part in the classification of races as anthropologists had thought twenty or thirty years ago. It presents too many individual variations to be taken as a distinctive character of race. The degree of prognathism is measured by means of different facial angles. . . .

The chief of the angular measurements on the living person is also the facial angle; great importance was formerly attached to it when prognathism was still considered a trait of inferiority. In spite of the numerous instruments invented, such as the double square, Harmand's instrument, Jacquard's goniometer, etc., great precision is not attainable in these measurements. . . .

THE EYE

The eyes furnish some differences of form. We distinguish the ordinary eye, as among ourselves, and the oblique or narrowed Mongolian eye. The latter in its most perfect form is characterized as follows. It is placed obliquely, so that its external angle is higher than its inner angle. . . . The essential characters of the Mongolian eye however consist, as Metchnikof has shown, in a puffiness of the upper eyelid, which turns down at the inner angle of the narrowed eye, and, instead of being free as in the ordinary eye, is folded towards the eyeball, forming a fixed fold in front of the movable ciliary edge; this last becomes invisible and the eyelashes are scarcely seen. Moreover, towards the inner angle of the eye, the eyelid forms a fold more or less covering the caruncula and sometimes extending below it. These peculiarities, which can be met with quite often among children of all races as a transitory characteristic, may be explained up to a certain point by the very small development of the pilous system in the Mongolian peoples. For among Europeans inversion of the eyelid (entropion) may become a cause of disease (trichiasis) precisely on account of the growth of the eyelashes. . . .

THE BRAIN

Among the internal organs, the brain, or better encephalon, deserves a little more attention. I have already said that appreciable differences are observable in the volume of the brain-case according to age, sex, and race. This difference agrees with variability in the volume and weight of the brain. At birth, European boys average 334 grams of brain, girls 287 grams. This quantity increases rapidly up to 20 years of age, remains almost stationary between 20 and 40 or 45, then begins to decrease, slowly at first, until 60 years, then diminishes more rapidly.

Let me also add that the weight of the encephalon varies enormously according to individuals. Topinard in a series of 519 Europeans, men of the lower and middle classes, found that variations in weight extended from 1025 grams to 1675 grams. The average weight of the brain among adult Europeans (20 to 60 years) has been fixed by Topinard, from an examination of 11,000 specimens weighed, at 1361 grams for man, 1290 grams for woman. It has been asserted that the other races have a lighter brain, but the fact has not been established by a sufficient number of examples. In reality all the brain-weighings of non-Europeans that can be matched against these 11,000 European ones, amount to almost nothing. The fullest series that Topinard has succeeded in compiling, that of Negroes, comprises only 190 brains; that of Anamese, which comes next in fulness, contains only 18 brains. And what do the figures of these series teach us? The Negro series gives a mean weight not much different from that of Europeans—1316 grams for adult males; and the Anamese, a mean weight of 1341 grams, almost identical with that of Europeans. For other populations we have only the weight of isolated brains, of series of three, four, or at most eleven specimens. These are absolutely insufficient data for conclusions, seeing that individual variations are as great in foreign races as among Europeans, to judge by the Negroes, who vary from 1013 to 1587 grams, and by the Anamese, who range from 1145 to 1450

Not having at our disposal sufficient data for racial comparisons of brain weight, let us see if the skull capacity can not supply them. We know, since the investigations of Manouvrier, that we have only to multiply by the coefficient 0.87 the capacity in cubic centimetres of the cranial cavity to get with reasonable exactitude the weight in grams of the brain which it contained. Now the following is what we learn from the figures of cranial capacity brought together by Topinard. . . . Among Europeans the average capacity for men is 1565 c. c., varying from 1530 c. c. (22 Dutch) to 1601 c. c. (43 Finns). The capacity for peoples of other continents we find to range from 1583 c. c. (26 Eskimo) down to 1349 c. c. (36 Australians) and 1310 c. c. (11 Andaman Islanders). Between these two extremes the other populations would be thus arranged in a decreasing order of capacity: 36 Polynesians, 1525 c. c.; 18 Javanese, 1500 c. c.; 32 Mongols, 1504 c. c.; 23 Melanesians, 1460 c. c.;

74 Negroes 1441 c. c.; and 17 Dravidians of Southern India, 1353 c. c. The difference between the highest and lowest of these figures for non-Europeans is 255 c. c., or a little more than the difference between man and woman in all races.

Manouvrier gives the following weights, converted from cranial capacities: 187 modern Parisians, 1357 grams; 61 Basques, 1360 grams; 31 Negroes, 1238 grams; 23 New Caledonians (Melanesians), 1270 grams; 110 Polynesians, 1380 grams; and 50 Bengalis, 1184 grams. The difference of the extremes here is 196 grams.

Must we recognize in these racial differences of brain size and weight the influence of stature and bulk of body, as appears unquestionable for the sex difference? One is tempted to believe this when one sees that the largest brain weight in Europe, 1417 grams (157 brains), is found among the Scotch, whose stature is the highest in the human species; and that the mean brain weight of Italians (244 cases), whose average stature is rather small, is only 1308 grams. The Polynesians and Caucasians, peoples of high stature, also outweigh the Andaman Islanders and Javanese, of very low stature. However, we see, on considering both brain weights and cranial capacity, that Negro populations of very high stature, also the Australians and New Caledonians of medium stature, have a smaller cerebral weight than the short Eskimo and certain low statured Asiatics like the Javanese.

There is thus a double influence: that of stature and that of race. We might introduce a third element—the weight of the body; but it represents too many different things, varying according to the individual's inclination toward stoutness, his diet, and mode of life. C. Voit, experimenting on two dogs of nearly equal bulk, found that the weight of the brain of the well-fed dog represented 1.1 percent. of the weight of its body, while the brain of the dog that had fasted twenty-two days constituted 1.7 percent. of the weight of the body. At all events, we cannot deny the influence of the bulk of the active parts of the body on the volume of the brain.

But then a new question arises. Is the increase of the volume of the brain made at the cost of the white substance formed solely of conducting-fibres; or of the gray cortex substance formed principally of cells with their prolongations (neurons), that is to say, the part which is exclusively involved in mental processes? This question still awaits its solution. It is not the gross weight of the brain, but really the weight of the cortical layer which should be compared in the different races and subjects, if one is to judge of the quantity of substance devoted to mental functions. Until the necessarily very delicate weighings of this kind shall have been actually made, we have only a round-about method of ascertaining the quantity of the gray substance: by measuring the superficial area which it occupies.

The cerebral cortex, composed of the gray matter, forms on the surface of the brain sinuous folds called cerebral convolutions. Now, in brains of equal volume, the more numerous, sinuous, and complicated these folds, the

greater will be the surface of the cortex. As the thickness of the gray layer is very much the same in all brains, it is evident that the complexity in the structure of the convolutions corresponds to the increase of the gray substance, and consequently of mental force. Now, the little that is known of the cerebral convolutions in different races, and of various persons in the same race, appears to conform to this deduction. The brains of idiots, of the feeble-minded, present very simple convolutions, almost comparable to those of the anthropoid apes, whose brain is like a simplified diagram of the human brain. On the other hand, distinguished personages, great scholars, orators, men of action, exhibit a complexity, sometimes truly remarkable, of certain convolutions.

I expressly say "certain" convolutions, for all these folds, which are arranged according to a plan common to all human beings, do not have the same value physiologically. In the gray layer of certain of these convolutions are the centers of motor impulses and of general bodily sensibility; for example, those which are arranged around the fissure of Rolando. Some of these regulate the voluntary movements of the limbs, trunk, and head; while others are connected with visual, auditory, gustatory, olfactory sensations. These various motor and sensorial regions—centers of projection, they are called—make up nearly a third of the gray matter of the brain. But there are a great many other convolutions, the gray matter of which is unconnected with any special function. What is their purpose? Basing his opinion on the tardy myelinisation of the nerve fibers ending in these convolutions, subsequent to birth and to the myelinisation of the sensory and motor center fibers, Flechsig supposes that these convolutions are designed to enable the different brain centers to communicate with one another and to render us conscious of this communication. Therefore he has named their gray substance "centers of association." Without these convolutions, the other centers would remain isolated and condemned to a very restricted activity.

Now, as the eminent anatomist Turner has shown so clearly, the convolutions of the sensory and motor centers do not present any great differences in the brain of a child, a monkey, a Bushman, or of a European man of science like Gauss. What differentiates these brains is the degree of complexity of the convolutions concerned with association. It follows, then, that the parts of the brain available for comparison—the associational parts—are less than the whole by the motor and sensory regions—a third of the brain cortex.

But let us suppose that differences of volume and weight are found in these associational two-thirds of the gray matter. Have we more reason to think that we are approaching a solution of the problem? Hardly. It is believed that only certain cells of the gray substance, namely, the great and little pyramidal-shaped cells, are associated with mental activity. Each of these, forming with its axis-cylinder, dendrons, and other branching prolongations what is called a neuron, is believed not to be in constant connection

with other neurons, nor to occupy a fixed permanent position in regard to them, but, by means of its prolongations, to place itself alternately in contact with a great number of them.

The nervous currents resulting from these continual changes of contact must be extremely complex. Thus cerebral activity would very likely have to be measured not merely by the number and size of the gray matter cells, but also by the number and variety of habitual contacts which are probably established after education or training of the cells. As from the same number of piano keys the novice can produce only a few simple strains, while an artist elicits varied melodies, so from a practically equal number of cells a savage would be able to extract only vague and rudimentary ideas, while a thinker would bring intellectual treasures out of them.

How far from a true appreciation of brain functioning are we then with our rude weighings of the organ; when, together with the quarter that would assuredly help us solve our problem, we must weight three other quarters that have nothing or almost nothing to do with cerebration! And even if we succeeded in finding the number, weight, and volume of the neurons, how are we to estimate the innumerable combinations of which they are capable? The problem appears almost insoluble.

However, in science we must never lose hope, and—who knows?—perhaps some day the solution of the question will be found, and may then appear as simple as to-day it appears a matter of course to see through the body with the X-ray.

17. RACE, LANGUAGE AND NATIONALITY IN EUROPE¹

By HUMPHREY J. JOHNSON

Of the various physical characteristics which mark off the different branches of mankind from each other the colour of the skin is that which most easily attracts the eye of an observer; hence it was most natural that the early attempts to classify the races of man should have been made upon this basis. In the 18th century Linnæus assigned to "*Homo Europæus albus*" the position of being one of his four primary divisions of the human species. The name was not strictly accurate, however, as under it there had to be tabulated the populations of North Africa and South-eastern Asia, which were little if any darker than the peoples of Southern Europe. In the early 19th century Blumenbach gave to the white-skinned peoples of Europe, Asia and Africa the name Caucasian, after a skull from Georgia which he greatly admired. This name has lasted long, and is still in use, but since it has to include such peoples as the dark Arabs and the fair Swedes, some further division of the white race was recognised to be a necessity. This step was taken by Huxley, who in 1870 divided into two stocks "fair whites" (*xanthochroi*) and "dark whites" (*melanochroi*). The two stocks overlapped in Central Europe, and Celtic speaking peoples were found belonging to both. Of these two Huxley supposed that the *xanthochroi* of Northern Europe were the original stock and that the *melanochroi* of the Mediterranean area were produced by intermixture between the former and a brown race. At this time, however, the problem of devising a satisfactory method of classifying the population of Europe was complicated by that confusion between philological and anthropological terms which has wrought such dire havoc with ethnological nomenclature. Comparative philology had made it clear that with few exceptions all the languages of Europe could be traced back to a single ancestral stock, offshoots of which had also found their way into Persia and India. This family of languages received the names "Aryan," "Indo-European" or "Indo-Germanic," and it began to be readily assumed that there must have existed an Aryan race, a doctrine which still lingers in modern geography books. No one, however, could say whether the early Aryans were dark whites or fair whites. Max Müller ventured to launch the opinion that their original "habitat" had been "somewhere" in Asia, though he later abandoned the hypothesis than an Aryan race had existed. With the exception of Greek and Albanian, the Aryan languages of Europe fall into four groups—Romance, Celtic, Teutonic and Letto-Slavic.

¹The Sociological Review, volume 11, pages 37–46, 1919.

It has of course always been known that the Romance languages owe their present distribution not to the circumstance that they were carried to the lands in which they now prevail by a single race, but to the fact that these lands were once under the influence of a common civilization. Hence, although we meet the expression "Latin race" in newspapers and reviews, we do not encounter it in manuals of ethnology. The origin, growth and distribution of the Celtic, Teutonic and Slavic branches of the Aryan family are, however, shrouded in much obscurity, and this fact has enabled writers to employ these terms now in a linguistic and now in an ethnological sense. The tall fair-haired barbarians who swarmed down from the Alps upon the Italian plains were called by the classical writers Celts, though in the first century before the Christian era, at the time of Cæsar's conquest of Gaul, a distinction between the Celts and the Teutons began to be made. The Slavs do not, however, figure prominently in European history till Byzantine times. The precedent set by the classical writers was followed, and it was customary to regard the Celts as a fair-haired race, till about 1850, when Broca, who was then conducting his anthropometrical researches into the composition of the French nation, showed that the Bretons—the only Celtic speaking people on the continent of Europe—had dark hair, from which discovery it followed that a distinction must be made between the use of the word Celtic as a linguistic and an anthropological term.

The recognition of this fact has simplified the work of subsequent investigators, and in the two most comprehensive attempts to classify the European peoples which have been made in recent years, those of Ripley and Deniker, "Celtic" does not appear as a racial term. These two investigators, fully alive to the errors into which their predecessors have fallen through failing to distinguish clearly between language and race, have attempted to systematize the European peoples solely by the use of physical criteria. Their results are at first sight strikingly dissimilar, although they have been reached by the use of almost identical material. Professor Ripley recognises three European races: (1) a tall, fair-haired dolichocephalic race, which predominates in the countries bordering upon the Baltic and the North Sea, which he names the Teutonic race; (2) a brachycephalic race of medium height, brown hair and eyes, stretching from Brittany through the highlands of Central Europe, the plateau of Central France, the Auvergne and Vosges through South Germany, Switzerland, the Austrian Empire and the Balkan states, across the sea of Marmora, through Asia Minor and Armenia to Persia and Afghanistan. This race he names the Alpine; and (3) a short, dark-haired, dark-eyed dolichocephalic race, which is found in the lands lying round both basins of the Mediterranean and which is found in its greatest purity in such isolated areas as the island of Sardinia. The existence of this physical type in the Iberian peninsula, Italy, Greece and North Africa has been recognized by the Italian craniologist Professor Sergi, who has named it the Mediterranean race, a name retained by Ripley. The scheme of classification adopted by Deniker, the

late Librarian of the Musée d'Histoire Naturelle at Paris, is somewhat more elaborate than Professor Ripley's. This authority postulates the existence of no less than six primary and four secondary races in Europe. It is possible to some extent to equate the two schemes. Thus Deniker has a Nordic and "sub-Nordic" race corresponding to Ripley's Teutonic, a Cévenole or Occidental and a Dinaric or Adriatic corresponding respectively to the Western and Eastern ends of Ripley's Alpine, and two more which correspond to the Mediterranean race.

Can the more elaborate scheme be said to possess any advantages over the simpler one? By the recognition of an Adriatic or Dinaric race the taller portion of the brachycephalic race prevalent throughout Central Europe which occupies Bosnia, Herzegovina, Montenegro and Albania is differentiated from the shorter portion in West and Central Europe. It is impossible, however, to suppose that Deniker's six races and four sub-races ever existed as independent types, rather it appears that they represent local combinations of physical traits. With Ripley's three races, however, the case is somewhat different. It seems that they can put forward some sort of claim to have had an objective existence.

This does not mean that if we take a given area in Northern, Central or Southern Europe we shall find that in any particular area a majority of the inhabitants possess all the characters of the ideal racial type. All we can say is that some of the various characters which go towards making up the racial type are possessed by the majority of the population. For instance, in a given area in Northern Europe 60 per cent. of the population may be tall and 60 per cent. may be blonde, but not more than 20 per cent. need be tall blonde. The pure racial type has dissolved like a lump of sugar in a cup of tea. Ripley accounts for the present population of Europe as follows. In very early times there existed two races of man—a long-headed African race and a broad-headed Asiatic one. In Quaternary times the various migrations of African long-heads invaded Europe by the three routes then open to them; that is, across the land bridges which then connected Spain with Morocco, Tunis with Sicily, and Cyrenaica with Greece.

The palæolithic races of Europe were all long-headed, broad-headed skulls becoming common only in the Azilian or Mesolithic period. We must suppose that the long-headed population of Europe ultimately developed, probably under climatic influences, into two types, one tall and fair in the North, and another short and dark in the South. The population of the Mediterranean basin seems to have remained substantially unchanged since Neolithic times and the present distribution of the Mediterranean race to have been then already achieved. No remains of Pleistocene man have as yet been forthcoming from Ireland, Scotland or Scandinavia, but the basin of the Baltic has been surrounded since Neolithic times by a tall, long-headed population. The round-headed race of Central Europe which has become wedged in between the two long-headed races is regarded by most authorities as an intrusive Asiatic

element, though the alternative theory that a mountainous environment induces brachycephaly has been maintained by Professor Ridgeway. On the former theory the existence of the short-headed race of Central Europe is to be accounted for by successive waves of migration from Asia into Europe from Neolithic times onwards. It has its counterpart in the broad-headed element found in the highlands of Asia Minor, Persia and Afghanistan. The Mediterranean type is also represented in South-eastern Asia.

Professor Ripley's hypothesis of the origin of the European peoples appears to fit the facts as well as any other which has been advanced up to the present, and his three types certainly have some claim to the possession of an independent existence. The names which he assigns to them are, however, not entirely above criticism. He calls his northern race the Teutonic. The defect of name is that in popular etymology it includes all peoples who speak Teutonic languages, the English, Scotch, Irish, Flemings, Dutch, the Germans, Danes, Norwegians and Swedes. Now these peoples embrace a very large population which does not correspond physically to his Teutonic type. For instance, the Alpine type predominates in South Germany, German-Austria and German-Switzerland, and Teutonic-speaking people of Mediterranean type are found in England and Ireland, while the physical type which Ripley calls Teutonic is found in the Hebrides, in what were the Baltic provinces of the defunct Russian empire, and in Finland, in which countries Celtic, Slavonic and Finno-Ugrian languages prevail. If we consider these facts it becomes clear that the use of the term word Teutonic, both as a linguistic and as an anthropological term, may beget as much confusion as the similar misuse of the terms "Aryan" and "Keltic."

When therefore we come to choose in which sense we shall use the word Teutonic there can be little doubt that the linguistic one will be the wisest, since it has been hallowed by long use. We must then find an alternative name for the blonde dolichocephalic race of Northern Europe. Deniker calls it the Northern or Nordic race, and this term, being a geographical one, involves no question-begging assumptions with regard to languages, etc. The name Boreal has also been suggested, but it is somewhat ugly and perhaps has too much of an Arctic sound about it. Ripley gives a geographical name to the broad-headed race of Central Europe by calling it the "Alpine." Some writers have called it Celtic or Celto-Slavonic, but both these terms are misleading since its members speak a Celtic language in Brittany, Romance languages in Central France, Northern Italy and Roumania, a Teutonic language in South Germany, Switzerland and Austria, a Finno-Ugrian one in Hungary, and Slavonic ones in Eastern Europe. The term Alpine has this in its justification that the Alps are the most striking physical feature of the part of Europe which the race inhabits; one cannot but feel, however, that it is a somewhat narrow one to apply to a physical type which stretches from Brittany to Afghanistan. The term Celtic has been suggested owing to the belief that this race brought Celtic languages into Western Europe and Celto-Slavonic

as embracing its most westerly and most easterly limits in Europe, but both are unsatisfactory, as Celtic and Slavonic languages are spoken by peoples who do not belong to it. To rectify the narrowness of the name "Alpine" the term "Alpine-Armenoid" has been devised, "Armenoid" referring of course to the brachycephalic substratum of the population of Anatolia, a population which may with some probability be identified with the ancient Hittites. Its chief defect is of course its clumsiness. The term Eurasian would have been a good one to express the geographical distribution of this race, but unfortunately it is needed for another purpose. On the whole it seems best to use the term "Alpine-Armenoid" when we wish to speak of both its European and Asiatic halves, and "Alpine" when we are confining ourselves to the European one. As to the third of the three great European races the term "Mediterranean" in every way suits it. It indicates its geographical position, and begs no question with regard to language. If then ethnologists would agree to denominate the three main physical types in Europe the Nordic, Alpine or Alpine-Armenoid and the Mediterranean, and to use the term "Celtic," "Teutonic" and "Slavonic" solely as linguistic terms as is now being done with the term "Aryan," an immense amount of confusion would be saved. By persisting in their use as racial terms we are only inviting confusion, as all must admit when we reflect that Celtic languages are spoken by peoples of Nordic type in Scotland, Mediterranean type in Ireland, and Alpine type in Brittany; Teutonic languages by peoples of Nordic type in Britain, Holland, Scandinavia and North Germany, and by members of the Alpine race in South Germany, Switzerland and Austria, while Slavonic tongues are spoken by Nordic peoples upon the shores of the Baltic and by Alpine ones in the Balkans, and, lastly, we find the Romance languages spread among the three races. These are spoken among peoples of Nordic type in Northern France and Belgium, among peoples of Alpine type in Central France and Northern Italy and among peoples of Mediterranean type in Southern France, Spain, Portugal and Italy. When we have got the distinction between race and language clearly fixed we may turn to consider the question among which of the races in Europe did the various linguistic families originate. We know of course that the source from which all the Romance languages have sprung was the speech of a people of mixed Alpine and Mediterranean race in Central Italy. Again there can be little doubt that Celtic tongues were introduced into Western Europe by a migration or migrations of the Alpine race, but whether the speakers of the original Slavic dialects were members of the Alpine or of the Nordic race does not seem to be clear.

Teutonic speech seems to have been communicated to peoples of Alpine stock by southerly and westerly migrations of the tall, blonde dolichocephals of Northern Europe. These problems are, however, all subordinate to the main one in the relations of race and language in Europe, viz., to which of the three European races must we ascribe the original introduction of Indo-European languages into our continent?

Max Müller, after he had abandoned his belief in an Aryan race, said that it would be just as sensible to speak of one as to speak of a brachycephalic grammar or a dolichocephalic dictionary. Nevertheless, although we cannot speak of an Aryan race, it is obvious that the tribe which spoke the original Aryan dialect must have existed somewhere. That they were a pastoral people is admitted, and so far as geographical considerations go their "habitat" might have been anywhere between the Carpathians and the Pamir. The fact, however, that comparative philologists regard the Baltic group which comprises the Lithuanian, Lettish and now extinct old Prussian languages as the most archaic branch of the Indo-European family has led to the belief that the locality of this people may have been somewhere in the neighbourhood in which tongues have been spoken. If this inference is correct it seems that the original Aryan-speaking people belonged most likely to the tall, blonde North European race, which since the close of Neolithic times has dwelt round the basin of the Baltic. These Nordic peoples would have passed on Indo-European languages to the Alpine race who would diffuse them throughout Central Europe and into South-eastern Europe; offshoots of the Alpine race migrated both in historic and prehistoric times into the Iberian peninsula, into Italy and Greece, and very likely brought Indo-European languages with them. If, however, on the other hand, it were shown that the Indo-European languages originated among a people of Alpine stock then the history of their diffusion must have been somewhat different, and their introduction into Northern Europe have been due to a northern migration of a part of the Alpine race. That such a movement must have at one time taken place we know from the fact that a considerable proportion of brachycephaly is found in Denmark and Southern Norway. The third alternative that Aryan languages were first spoken by peoples of Mediterranean stock seems to be the least probable.

The only non-Aryan language in Western Europe is Basque, spoken by a people dwelling on both sides of the Pyrenees. There seems little doubt that it is the last remnant of a great family of agglutinative languages which prevailed widely throughout Europe and probably also on the Southern shores of the Mediterranean in Neolithic times.

Having considered the question of how far languages and race are coterminous in Europe, we may turn to the question of their relation to what we call nationality. The outbreak of the late war found Europe divided into twenty-one different States; of these ten, viz., the German Empire, the kingdoms of Italy, Belgium, Norway, Greece, Roumania, Bulgaria, Serbia and Montenegro, and the Principality of Albania—had existed as independent political entities for less than a century, and of the remaining continental States only Spain and Portugal retained the frontiers with which the Congress of Vienna left them a century ago. In no single case was language absolutely coterminous with nationality, that is to say was one language spoken by all the inhabitants of a single political organism and by no one else. Norway

and Sweden appear to furnish the nearest approach to this ideal, as with the exception of the Lappish element in the North of the Scandinavian Peninsula which is of alien race as well as of alien speech the languages which take their names from these States are more or less coterminous with the States themselves. This is also practically true of Holland, but in other cases the ideal (if it be an ideal) is rarely even approximately reached. Thus we see that while the French nation is ethnologically made up of the three Great European types we find that in the political organism which we call France there exist strata of speech which enable us to reconstruct something of the linguistic as well as of the anthropological history of the continent. In the south-west corner of the country we still find a vestige of some pre-Aryan linguistic family brought in probably by the Mediterranean race which ultimately broke down in this part of Europe before the invasion of Celtic-speaking tribes belonging to the Alpine race; their language in its turn gave way except in Brittany before Latin, another language of the Indo-European family which in a modified form spread over practically the whole country.

We are, however, reminded of the fact that peoples of Teutonic speech overran the country in the 5th century on the withdrawal of the Roman legions by the circumstance that Flemish, a Teutonic tongue, lingers, especially in place names in North-eastern France. But the bulk of the Teutonic as well as of the Celtic tribes changed their own languages for a Romance one; in the former case the conquerors adopting the speech of the subject people, in the latter the conquered accepting the language of the conquerors.

On the other hand the French language is spread beyond the political boundaries of the country into the territories of all its Eastern neighbours in Belgium, Luxemburg, Germany, Switzerland and into the Val d'Aosta in North-western Italy. The relation of the late German Empire to language and race is less complicated, but still presents some features of interest. Only two instead of the three great European races are represented, the Nordic and the Alpine, while traces of the pre-Aryan and Celtic tongues which must once have been spoken over a large part of the country have vanished. Within its limits were to be found, however, another Teutonic language, viz., Danish in Schleswig, and representatives of two other branches of the Indo-European on the Western and Eastern marches of the Empire respectively, viz., French in the part of Lorraine annexed in 1871 and Polish in the Eastern provinces.

When we turn to Eastern Europe the problem of the relation of nationality to language and race becomes far more complicated. Three instances, however, especially arrest our attention—Hungary, Roumania and Bulgaria. The Hungarian language belongs to the Finno-Ugrian stock, and was, of course, brought in by one of the numerous tribes of Mongoloid origin who wandered into Eastern and Central Europe during the Dark Ages. This language is now, however, spoken by a people who approximate to the Alpine type of Central Europe and have lost their Asiatic features. On the other hand, the Bulgarians, another Finnic people, have settled in the Eastern half of the

Balkan Peninsula, and have exchanged their original language for a Slavonic one; while the Roumanians physically resembling their neighbours of Slavonic speech have exchanged a Slavonic tongue for a Romance one.

We see thus that in the history of Europe the races appeared first, the languages second and the nationalities last. The three great European races have been established roughly in their present position since the Bronze Age, perhaps even since the Neolithic. The great linguistic divisions, Romance, Celtic, Teutonic, Slavonic and Finno-Ugrian, occupy approximately the same geographical areas which they occupied a thousand years ago, but nationality is a phenomenon which scarcely existed before the Renaissance. Political accidents have determined why certain linguistic areas have attained to the dignity of independent States while others have been divided between two or more States and others again are in the position of submerged nationalities. This may be best illustrated by the political history of the Iberian Peninsula. The physical characters of the inhabitants of this part of Europe are remarkably uniform, the population being dolichocephalic and brunet. There is not a single brachycephalic province in Spain. Throughout the Peninsula four languages are spoken, the pre-Aryan Basque in three Northern provinces, Guipozcoa, Viscaya and Alava, and three Romance tongues, Catalan in the Eastern portion of the Peninsula, Castilian throughout the centre from north to south, and Portuguese in the west extending across the Northern frontier of Portugal into the Spanish province of Galicia. If race in the physical sense was to decide political boundaries then the whole Peninsula ought to be under a single Government; if language then (setting aside the Basques) we should have three States, viz., Portugal, Castile, and Catalonia. As a matter of fact, we have two—Portugal and another embracing Castilians and Catalans which we call Spain. When we look into the cause of this we find that it is due to a marriage contracted in the 15th century between a Queen of Castile and a King of Aragon; if, on the other hand, as Freeman has pointed out, Isabella of Castile had married the King of Portugal instead of the King of Aragon, we should still have had one race and four languages in the Peninsula, but different nations from those which we find to-day. Since the inhabitants of Portugal and Castile would have formed a 'nation which we should still probably call Spain, while Aragon and Catalonia would have either formed a separate nation or would have become absorbed into France.

A nation, it seems, may be formed in two ways; either a political accident has forced a group of people to live under a common government or else a common language, and more especially a literature, has produced a common social consciousness which makes those who speak the tongue and read the literature desire to form an independent political organism. The relation of nationality to language and race ought to be carefully considered at a time when so many are clamouring for the drawing of political frontiers along what are miscalled ethnological boundaries.

18. THE EARLY INHABITANTS OF WESTERN ASIA¹

By FELIX VON LUSCHAN

Standing on the "New Bridge" in Constantinople, near the Mosque of the Sultan Validé, I have more than once tried to count the languages and dialects spoken by the crowds pressing and pushing between Galata and Stamboul. Turkish and Greek are naturally the most frequently spoken, but one also easily distinguishes much Armenian, Arabic, Kurdish, and Persian. We hear the harsh voices of some Circassian soldiers, and learn from an Abkhasian friend that he does not understand their language and that "it might be" Lesghian. He also tells us that many of his Circassian friends serving in the same regiment are obliged to speak Turkish when they want to understand one another.

We then meet Albanians, Bulgarians, Roumanians, and are addressed in Serbo-Croatian by an old priest from Bosnia. You are sure to hear in less than five minutes five other modern European languages, English, French, German, Italian, and Russian, and then your ear is delighted by the melodious Spanish of some Spaniole Jews from Salonika, who still retain the idiom spoken in Spain when they were expelled from there more than 400 years ago, and have thus actually preserved the language spoken by Cervantes. And we hear other Jews on their pilgrimage from Russia and Poland to Jerusalem, speaking their curious Yiddish, a sort of German that no German could understand without making it a special study. Once on this bridge, I had to play the interpreter between a Hungarian Gypsy and some Aptals or other Gypsies from Anatolia, and an instant later I saw a Dinka eunuch sitting on the motor car of an imperial princess and making his selam to a group of equally dark and equally tall Bari or Shilluk. . . .

Another day, on the same bridge, I met some East Indians, speaking, as they told me, Hindi, Hindustani, and Gujerati, and trying in vain to come to an understanding with a large troupe of African hajjis returning from Mecca, some of whom were Hausa, others from Zanzibar and the Swahili coast, others from Wadai and Baghirmi. One may also meet on this bridge Mohammedans from China and from Indonesia, and, to complete this Babylonian confusion of languages, some day or other even a Papuan from Doreh or some other place in Dutch New Guinea may appear there on his hajj to Mecca.

¹From Felix von Luschan, "The Early Inhabitants of Western Asia," the Huxley Memorial Lecture for 1911, published in *Journal of the [Royal] Anthropological Institute [of Great Britain and Ireland]*, volume 41, 1911, republished in *Smithsonian Report for 1914*, pages 553-577, 1915.

Not less numerous than the languages are the types one meets in Constantinople or in any other of the larger towns in western Asia, and even within a linguistic group there is generally a most striking diversity of somatic qualities. There are Turks with fair and Turks with dark skin; Greeks with short and Greeks with long heads; Arabs with broad and low noses; and other Arabs with narrow and high noses; Kurds with blue and Kurds with black eyes; and the more one studies the ethnography of the Ottoman Empire the more one sees that "Turks" in reality means nothing else than Mohammedan subjects of the Padishah, that "Greeks" means people belonging to the Orthodox church, and that "Arabs" are people speaking Arabic—the somatic difference between a Bedouin from Arabia or Mesopotamia and an "Arab" farmer from near Beyrout is striking, and they have nothing in common except their language.

Also the study of the modern religions in western Asia is of no help to us in this labyrinth of types. There are Greeks who look like Mohammedans, and many Ansariyeh or other ("Moslem") sectaries are not to be distinguished from Armenians. Religion, too, is here much more closely connected with late historical events than with races or nations, and is only too often of a merely accidental character.

Even the old historians do not help us. Their anthropological interests were generally trifling, and important statements like the note that the Armenians "*πολλὰ φρυγίζουσιν τῇ φωνῇ*,"² or that a tribe from the Solymian Mountains spoke Phoenician, are extremely rare in the old writers, who give us names like Lycians, Carians, Cilicians, Paphlagonians, Cappadocians, Lydians, and so on, but, generally, do not give us the slightest details as to their place in an anthropological system.

So we can well understand how, 50 years ago, G. Rosen, then perhaps the best authority on the nations of Asia Minor and Syria, could say that the anthropology of Western Asia would "always remain a mystery."

Since then minute anthropometric researches and vast excavations have both thrown light on most of the problems connected with this "mystery," so that it may now be considered as practically solved.

My own way of proceeding was to eliminate one by one every national or racial element that could be traced as having come from outside, and then to study the remainder. It was my good fortune to begin archaeological and anthropometric field work in Lycia as early as 1881, and since that time I have never ceased to collect all available data connected with the natural history of man in western Asia. So it is the work of 30 years of which I shall now try to give a short account, and this will be done best by beginning with the ostensible foreign elements and then describing the remaining tribes and groups.

²Speak much like the Phrygians.

A. DARK AFRICANS

These are naturally by far the easiest to eliminate, and they have only in a very insignificant way contributed to the building up of the white communities in Asia Minor and in Syria, although they have been imported there from the earliest historical times down to our own days. Even now there are few houses of wealthy Mohammedans without dark servants, male or female, and without half-caste children of the most various tints. Nowhere, perhaps, with the exception only of Brazil, could miscegenation be better studied than in the large towns of the Levant. Domestic slavery is still flourishing there, and "black ivory" generally comes, as in the old times, from the Upper Nile, but also from Bornu. In the Turkish-speaking south of Asia Minor a dark African is generally called "Arab", in Syria, "Maghrebi" or "Habeshi." As far as I know, social inferiority is never connected with color; half-castes frequently intermarry with whites, but still there is no real negro permeation of the other natives, probably because that section of the offspring which reverts to negro qualities does not stand the climate.

B. CIRCASSIANS

About a million of the Mohammedan inhabitants of the Caucasus immigrated into Asia Minor and Syria after the fall of Shamyl. The lot of these muhajir (refugees) was generally a melancholy one; the Ottoman Government did its best to give them land, but land without a master is rare also in Turkey, and in many places the result was a fight of all against all or a state of regular brigandage, often resulting in the final extinction of the Circassians. Where the land given to them was really masterless, it lay in unhealthy swamps and marshes, where malaria raged and carried them off at a terrible rate year by year. I know a place near Islahiyeh where more than 1,000 Circassian families were settled about 1880; now only 7 of them remain, and these in a wretched state of fever and disease. Only a very few of these Circassian colonies are really thriving, and probably most of these glorious sons of snowy mountains will in a few generations have paid with their lives for their fidelity to Islam.

Till now the Circassian blood has not seriously influenced that of their Turkish neighbors and probably never will. The colonists very seldom give their daughters to Turks or Arabs, and the "soft Circassian beauties" play a larger part in fiction than in actuality.

F. FRANKS AND LEVANTINES³

Frenghi (Franconians or Franks) is the common name for the European Christians (and also for syphilis) all over the nearer Orient, and the descen-

³The accounts of the following nationalities have been omitted in the present extract: C, Albanians; D, Bulgarians; E, Bosnians; I, Turkomans; J, Yuruks; L, Tahtadji; M, Bektash; N, Ansariyeh; O, Kyzylbash; P, Druses; Q, Maronites.

dants of European, generally French and Italian, and therefore Roman Catholic, families are called Levantines. They take only a minimum share in the building up of the oriental populations. In Marmaritzta near Halikarnassos, where a British squadron had a winter station for many years, a very great proportion of the children are said to flaxen-haired, and at Kynyk, the ancient Xanthos in Lycia, I met in 1881 a Mohammedan, quite fair, with light blue eyes, of rare intelligence, and with nearly a fanatical interest in geographical and archaeological problems. He was born in 1841, a year after the second expedition of Sir Charles Fellows, at Xanthos. Near Sendjirli I know an Armenian woman who is very fair; her own people pretend that she is the daughter of an American. But all these are rare exceptions, of no general importance, and I feel sure that the modern admixture of European blood is in no way responsible for the great number of light-colored people also in the interior of Asia Minor and Syria.

That in Oriental towns with very hot summers the death rate of light-colored children in Frankish and Levantine families is essentially larger than that of dark-colored has been often asserted, and would naturally be of universal anthropological interest if proved by serious statistics. Personally I do not know of one single light-colored Levantine family in places infected with heavy malaria.

G. JEWS

As the oriental Jews practically never mix with the other orientals, and so do not contribute in any way to the physical qualities of their oriental neighbors, they would be of no interest for this paper if we could not trace them back to very early times. But their racial position can only be investigated in connection with the old and oldest anthropology of Syria and Palestine. So for the moment we must here confine ourselves to the statement that there are several very distinct groups of oriental Jews.

By far the most numerous are now the Sephardim, speaking an early Spanish dialect, and descended chiefly from Jews expelled from Spain by the narrow-minded fanaticism of the fifteenth century. They have contributed not a little to the intellectual and economic development of the Ottoman Empire.

Of far less importance are the Ashkenazim, speaking "Yiddish," and descended from Jews emigrated from eastern Europe. The difference between these two groups was originally merely geographical and accidental, but now they are holding themselves rigidly apart, and I know of a small Ashkenazic community in southwestern Asia Minor that abstains from meat rather than eat of an animal killed by a Sephardic butcher. I could not learn if there were also differences in creed, but practically these two groups are like different sects, and in most places there is less intercourse between them than there is between Protestants and Catholics in the most backward villages of

Central Europe. This is perhaps of some importance in connection with the fact that both Ashkenazim and Sephardim are equally distinguished by a complete absence of uniform racial characteristics, just as it is with our Jewish friends in Europe.

The "enlightened public" of course knows better. Some Jews themselves state that they are "pure Semites, chosen and selected," and even in modern scientific papers one may still read of the complete "uniformity" of the Jewish type. But this uniformity only exists in the books and not in reality. There are Jews with light and with dark eyes, Jews with straight and with curly hair, Jews with high and narrow, and Jews with short and broad noses; their cephalic index oscillates between 65 and 98—as far as this index ever oscillates in the genus homo. Indeed, since my paper on the anthropological position of the Jews there is, as far as I know, no serious anthropologist who still maintains the cranial uniformity of the Jews. It is also conceded that the great majority of the Jews is decidedly brachycephalic, whilst the typical Semites are essentially dolichocephalic. But even giving up the cranial uniformity, one still speaks of the marvelous tenacity, frequency, and distinctiveness of the Jewish type of face. Now this "Jewishness" is much more easily felt than defined, and Joseph Jacobs (1885) was the first to try an exact definition. It is a certain and typical development of the nostrils (Jacobs's "nostrility") that is the best characteristic of what we generally call "Jewish."

Weissenberg, wanting to prove a specific Jewishness of type, relates how he showed some hundred photographs of Russians and Russian Jews without distinguishing or peculiar dress, etc., to two friends, a Russian and a Jew; the first was correct in 50 per cent., the second in 70 per cent. of his statements. I do not think this experiment very convincing; Weissenberg should have shown his friends photos of Greeks, Armenians, and Persians. The number of correct identifications would then have been certainly very much smaller, and it would have become evident that what Weissenberg takes to be "Jewishness" is nothing more than oriental, pure and simple. I shall refer to this statement toward the end of this paper, and meanwhile only want to advert to fig. 2, showing in the thick line the cephalic indices of 1,222 Jews; 52 per cent. of these were Sephardim, whom I measured at Smyrna, at Constantinople, at Makri, and in Rhodes; the rest were Ashkenazim measured by myself when I was one of the medical assistants in the Allgemeine Krankenhaus at Vienna, Austria.

Besides these two large groups there are other Jews in Turkey and in Egypt, who have been there since the early times of the Diaspora and longer. But they are few in number and I had no opportunity to measure any of them.

H. GYPSIES

A small but highly interesting group is formed by the Gypsies and their kin. About 30,000 of them are said to infect Turkey with their disorder and

inclination for theft and larceny. On the other side, they are cheerful company, men and women, not seldom with a certain beauty. They make baskets and sieves; the men are mostly blacksmiths and shrewd horsedealers. They are never settled in houses, but wander with their goat-hair tents, in winter time on the plains, in summer high up in the mountains. I once met a small "village" of about 10 Gypsy tents as high up as 8,000 feet. Unhappily, nothing is known about their early migrations and history; they speak Turkish in Asia Minor, Arabic in Syria, and keep secret their own language with so much care that my various and repeated efforts to get at least a few phrases turned out a complete failure.

In northern Syria I met a kind of Gypsies calling themselves "Aptal;" they lay a certain stress upon their *not* being Gypsies, but I could find no real difference either in their somatic qualities or in their ethnographic or social standing. Some of them often wander about like dervishes in groups of four or five, and with a large red or green banner; others are jugglers and conjurers and play tricks with serpents.

Gypsies never, or hardly ever, mix with other tribes in Syria or Asia Minor. They naturally pretend to be Mohammedans and have Islamic names, but they are always treated with a certain contempt or disesteem. Mohammedans hardly ever curse; but one of their rare abusive phrases is *tchingene* = gypsy.

Till now we have been treating of a few isolated groups that are very easily separated from the bulk of the tribes of western Asia. We now come to some nomadic tribes, who also form quite distinct groups: Turkomans, Yuruks, and Kurds.

K. KURDS

Kurdistan, the land of the Kurds, is a vast mountainous territory, nearly twice as large as Greece, in the southeast of the Armenian mountains. Its frontiers are undefined and uncertain, changing with the scattering or gathering of a floating mass of chiefly nomadic inhabitants. The greater north-western part is under Ottoman, the southeastern under Persian, control. We know of no political unity of the Kurds, and, so far as we can trace back their history, they were always forming many different tribes (ashirets) under independent chiefs, whose strength was only broken in the last century, in Turkey not without the aid of H. v. Moltke, then a young Prussian officer.

The Kardouchoi and Gordyæans of the old historians are most probably the direct ancestors of the modern Kurds, but we do not know when these tribes first set their foot upon the soil of their present home. The Assyrian annals and careful excavations on the upper Euphrates and Tigris will probably, at some future time, shed light upon this question.

Meanwhile it is important to state two facts: The Kurds speak an Aryan language, and they have long heads and generally blue eyes and fair hair. . . . So I may state that the western Kurds are dolichocephalic with an average in-

dex of 75, and with more than 50 per cent. of fair adults—the heads becoming shorter and larger, and the hair and eyes darker, with the increasing admixture of “Turkish” or Armenian blood.

So much for the western Kurds. We are up to the present very ignorant as to the somatic qualities of the eastern Kurds. I have myself only seen a very few Kurds from Persia, but the general impression of some of my scientific friends is that the eastern Kurds show a much higher percentage of darker and round-headed men than the western.

The language of the Kurds is split into many dialects; yet two main groups are to be distinguished, a western and an eastern. Both are related to modern Persian and are typically Aryan. So, if we ask for the real native country of the Kurds, there can only be one answer. It must be the same as that of our own race, of the race of Northern Europe. . . .

And can it be mere accident that a few miles north of the actual frontier of modern Kurdish language there is Boghaz-Köi, the old metropolis of the Hittite Empire, where Hugo Winckler in 1908 found tablets with two political treaties of King Šubbiluliuma with Mattiuaza, son of Tušratta, King of Mitanni, and in both these treaties Aryan divinities, Mithra, Varuna, Indra, and Našatya, are invoked, together with Hittite divinities, as witnesses and protectors?

And in the same inscriptions, which date from about 1380 B. C., the King of Mitanni and his people are called Harri, just as nine centuries later in the Achæmenidian inscriptions Xerxes and Darius call themselves Har-ri-ya, “Aryans of Aryan stock.”

So the Kurds are the descendants of Aryan Invaders and have maintained their type and their language for more than 3,300 years.

R. PERSIANS

Notwithstanding some recent researches, our knowledge of the anthropology of Persia is rather scanty. In a land inhabited by about 10,000,000, not more than 20 or 30 men have been regularly measured, and not one skull has been studied. . . .

The old type seems to be preserved in the Parsi, the descendants of Persians who emigrated to India after the battle of Nahauband (A. D. 640), of much purer form than among any true Persians. They are all short headed and dark.

My own measurements are confined to 15 adult men, Persians of the Diaspora, diplomats, consuls, and tobaccoists, whom I occasionally met in Constantinople, Smyrna, Rhodes, and Adalia. They were all very dark. Their cephalic indices run 73, 74, 74, 80, 81, 86, 86, 87, 87, 87, 88, 88, 89, 89, 90. So there is a large majority of brachycephals. I do not lay stress on the three dolichocephalic men, because a great number of Persians whom I saw, without being able to measure, seemed to be brachycephalic. Anyhow it is not im-

possible that in reality a certain number of Persians—I am very far from saying one-fifth of them—have long skulls. I never saw Persians with light hair and blue eyes, but I am told that in some “noble” families fair types are not very rare.

We know nothing of the physical characteristics of the Achæmenides, who called themselves “Aryans of Aryan stock” and who brought an Aryan language to Persia; it is possible that they were fair and dolichocephalic, like the ancestors of the modern Kurds, but they were certainly few in number, and it would therefore be astonishing if their physical characteristics should have persisted among a large section of the actual Persians. Still we must reckon with the possibility that an early “Aryan” invasion was not quite without influence also on the somatic qualities of modern Persians. Meanwhile much serious scientific work must still be done in investigating the anthropology of Persia ere we can replace mere conjecture by actual certainty.

S. ARABS

In dealing with the peoples of western Asia, in no case is it more important to keep language and race rigidly apart than when treating of the Arabic-speaking people. Friedrich Müller called all the various elements in Arabia, Palestine, Syria, and Mesopotamia “Arabs,” merely because they spoke Arabic. Nothing could be more erroneous. The material and mental culture of these tribes and their somatic qualities are widely distinct, and the extent of the Arabic language is infinitely larger than the extent of an Arabic racial element.

But peninsular Arabia is the least-known land in the world, and large regions of it are even now absolute “*terræ incognitæ*,” so great caution is necessary in forming conclusions, from the measurements of a few dozens of men, concerning the anthropology of a land more than five times as great as France.

My own measurements are confined to 38 Annezeh-Bedouins, whom I met in 1883 in Aleppo; 18 other Bedawy, generally Shammār, camel drivers between Mosul and Alexandretta; 20 Mohammedan “Arabs” living in the town Hamah, the site of the first Hittite inscriptions published; and 15 other Mohammedans from Syrian towns. Two groups, unfortunately very small, consist of 6 priests from Gesyra, whom I met in Aleppo, and 5 men from Hail, in Arabia, whom I was able to measure in Constantinople—in all 102 adult men, 61 of them real Bedawy and 41 settled in towns.

The cephalic indices of these “Arabs” ran thus:

Bedawy:	Number measured	Cephalic index
Annezeh.....	38	68 to 78
Other Bedawy.....	18	71 to 81
Men from Hail.....	5	70 to 74

Settled in towns:	Number measured	Cephalic index
"Arabs" from Hamah.....	20	85 to 89
Other Mohammedans from Syrian towns.....	15	76 to 89
Priests from Gesyra.....	6	83 to 86

Remarkably parallel with the cephalic index is the form of the nose in both these groups. The Bedawy as a rule have short and fairly broad, the other "Arabs" have, with few exceptions, high and narrow noses, often of an aquiline form.

What we generally call a "Jewish type" is found very seldom among real Bedawy and very often among the "Arabs" in the towns, but it would be difficult to reduce this statement to a statistical form, as the conception of "Jewishness" is too uncertain and precarious.

We shall later on try to understand the historical connection between these two types, the Bedawy and the other "Arabs." For the moment, we must restrict ourselves to having shown the marked difference that separates them.

T. TURKS

It is customary in most European languages to call the Mohammedan subjects of the Padishah "Turks." But the word should never be used in this sense without inverted commas; it is more than ambiguous and easily leads to serious misunderstandings.

A Turkoman tribe, the Othmanli, commenced from 1289 to conquer a great part of what is now the Ottoman Empire. A good many of the former inhabitants were then forced to speak Turkish and to turn Mohammedans. It is easy to understand that the descendants of the conquerors and of the conquered renegades intermarried freely, and, as the number of the conquering troops was naturally very much smaller than that of the original population, the great bulk of the 10 or 15, or perhaps more, millions of so-called "Turks" has now the physical qualities, not of the conquering Othmanli, but of the old pre-Othmanic inhabitants.

So the anthropology of Turkey is, like that of Hungary, a typical example showing how language, religion, nationality, and race are quite distinct conceptions, and it is interesting to see how they are again and again confounded by the general public and by the press.

In my paper on the Tahtadji I gave the indices of 187 "Turks" (Turkish-speaking Mohammedans) from Lycia, and was able to show that in the mountain villages, and in some swampy marshes not easy of access, people were generally short headed, and in the towns and on the coast long headed. Since then I have measured 569 more "Turks" from southern Asia Minor and northern Syria, so that I can now publish the cephalic indices of 756 adult men; they run from 69 to 96; if we count the indices 77 to 81 as mesaticephalic, 172 of these 756 men would be dolichocephalic, 151 mesaticephalic, and 433

brachycephalic, with a very pronounced maximum of 77 and 83 men respectively at indices 85 and 86.

These numbers speak for themselves, but it is perhaps useful to study first the corresponding figures for the two large remaining groups, the Greeks and the Armenians, and then to compare the results.

U. GREEKS

What has been said of the "Turks" is valid too in absolutely the same way for the "Greeks" of Anatolia and Syria. Some of them are certainly the direct descendants of old Ionians, Dorians, or Æolians, but the greater part are descended from other groups which spoke Greek and had accepted the orthodox religion.

I must here pass over the interesting problem of the Dorian and Ionian wandering and must restrict myself to some measurements taken on a series of 179 adult men calling themselves Greek and belonging to the orthodox church. I published this series in 1890, in my paper on the Tahtadji, and reprint here a graphic table (fig. 1) showing the frequency of the cephalic indices. It is very striking to see how the curve shows a maximum of 22 men with an index of 75, and a second maximum of 18 men with an index of 88.

Seventy-nine out of the 179 men are dolicho-, 84 are brachy-, and only 16 are mesaticephalic. If we reckon the arithmetic mean for the whole series, we get an average index of about 80, closely conforming to Weisbach's 95 skulls of Asiatic and European Greeks with an average index of 81.2, and with the series of Klon Stephanos, who found 80.8 for the Greeks in Europe and 80.7 for the Asiatic Greeks.

It is easily understood how dangerous and mystifying such an average index may be, if the material is composed of individuals from at least two different groups, as it manifestly is.

I am in possession of 93 skulls from a modern Greek cemetery in Adalia; they show about the same distribution of indices.

Long before the rediscovery of Mendel and his laws I tried to study the heredity of the cephalic index in the Greek families of Adalia. Here, in the old capital of Pamphylia, there is a large Greek colony, and as I had by good chance been able to give medical help to some of the influential members, I was permitted to measure parents, children and other relations in 67 families. The results were striking. I published a short abstract of them in 1889, in the *Reisen in Lykien*, and in 1890 in my paper on the Tahtadji.

There was a family A; the father had an index of 87, the mother of 73; of the two sons, the elder had an index of 70, the younger 87. In another family, B, the brother of the dead father had an index of 70, the mother 86, a son 82, a daughter 75. In a third family, C, both parents were brachycephalic, with indices of 85 and 86. Of their five children, only the youngest daughter

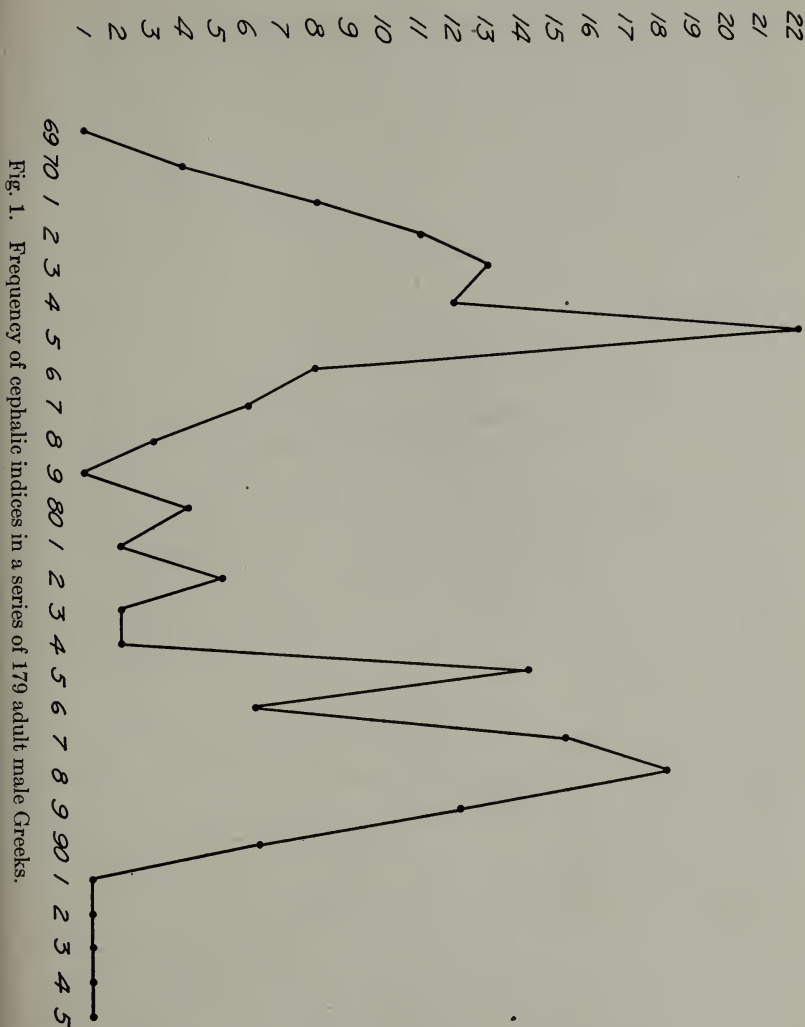


Fig. 1. Frequency of cephalic indices in a series of 179 adult male Greeks.

was short headed, with an index of 86, and four elder brothers had long heads with 72, 73, 75, and 73, respectively; 74 was the index of a brother of the mother.

If I now study these 67 families in the light of Mendelian researches, it seems as if neither brachy- nor dolichocephaly were dominant or recessive; they seem to be transmitted now with equal frequency, and this has probably

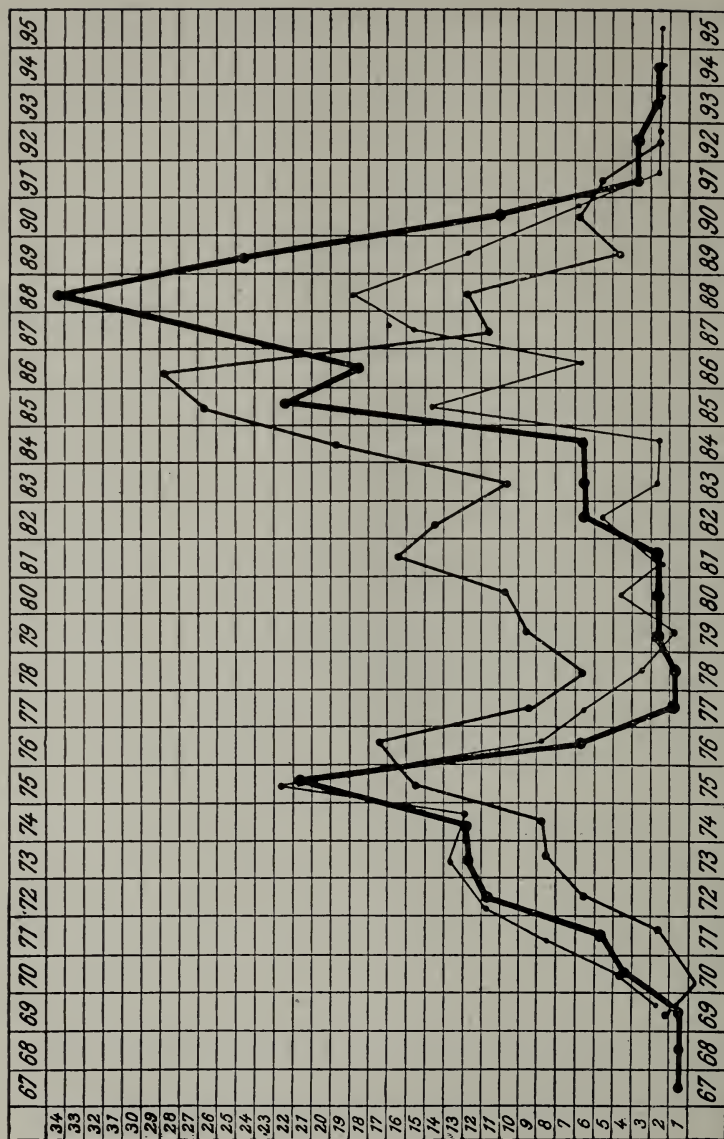


Fig. 2. Frequency of cephalic indices: 179 Greeks (light line); 756 Turks, reduced to one-third (medium line); 1222 Jews, reduced to one-fifth (heavy line.)

been the case for more than 2,000 years. At least, that is the age of the Greek colony of Adalia and for 60 or 70 generations short and long headed "Greeks" have been freely intermarrying. The result was, in many cases, not a mixture, as if we would mix red and white wine, but it was often a manifest reversion to the original types. I called this process "Entmischung,"⁴ but one might perhaps just as well say "Spaltung"⁵ or "reversion" or "restitution."

In this way good old types, once fixed by long inbreeding, do not necessarily get lost by intermarriage, but often return with astonishing energy.

The short heads of the Asiatic "Greeks" certainly correspond to the short heads of the "Turks" and of all the Moslem Sectaries described at length in this paper (fig. 2). We shall soon learn to know their real origin. The long heads probably do not belong to one uniform type; some of them are nearly as high as good Anglo-Saxon heads, and can perhaps be compared with the heads of Kurds; other long heads of Greeks are low, like the heads of Bedawy, and I am inclined to regard them as Semitic. They are, indeed, chiefly found on the sites of old Semitic colonies. In some of these places, as in Adalia, the women wear their hair in many thin plaits, like the old Assyrians, and they are famous for their "Semitic" appearance.

As in ancient Greece a great number of individuals seem to have been fair, with blue eyes, I took great care to state whether this were the case with the modern "Greeks" in Asia. I have notes for 580 adults, males and females. In this number there were 8 with blue, and 29 with gray or greenish, eyes; all the rest had brown eyes. There was not one single case of really light-colored hair, but in nearly all the cases of lighter eyes the hair also was less dark than with the other Greeks. . . .

V. ARMENIANS

Whilst "Turks" and "Greeks" have been proved to be composed of at least two quite distinct somatic elements, the third of the three great ethnic groups, which form the bulk of the inhabitants of Asia Minor, the Armenians, is comparatively homogeneous.

Of course they also have incorporated in themselves various alien elements, and I know Armenians from southern Persia who look like Biloch or Dravidians, but as a rule the great mass of the Armenians forms not only a religious, but also a somatic unity.

Particularly in northern Syria there are places where Armenians resemble one another like eggs. Religious seclusion and, in many cases, life in remote mountain villages, have both contributed to prevent intermarriage with strangers, and thus we may assume from the beginning that they represent an old type.

More frequently than any other group in western Asia they show the "planoccipital" form of the profile curve, great brachycephaly with extreme height of the skull and a particularly narrow and high nose. . . .

⁴"Unmixing." ⁵"Splitting."

SUMMARY

If we now sum up the results of our researches and try to review them in regard to the origin of the different ethnic groups of western Asia, we need not linger over the Negroes, the Circassians, the Albanians, the Bulgarians, the Bosnians, the Franks, and the Levantines. Their origin lies outside the scope of this paper. The same is true of the Gypsies and their kin, but it must be stated that perhaps one of the nomadic tribes in Asia Minor, the Yuruks, is in some way or other related with them.

Of far greater importance are the Kurds. From the great frequency of fair individuals among them, it is evident that their home must be in the north, and it is probable from their Aryan language that they are in some way connected with the Mitanni, who had Aryan divinities about 1280 B. C.

I am well aware that at present there is no real proof or decisive evidence for this statement, but, by way of a working hypothesis, I might be allowed to suggest that the Kurds, the Amorites of the Bible, the Mitanni of the Boghaz-köi tablets and the Tamehu of the old Egyptian texts are, if not identical, at least somehow related to one another. About 1500 B. C., or earlier, there seems to have begun a migration of northern men to Asia Minor, Syria, Persia, Egypt, and India. Indeed, we can now connect even Further India with the Mitanni of Central Asia Minor. On the tablets of Boghaz-köi the king of Mitanni not only calls himself and his people "harri," but he speaks of his noblemen as "mari," and Hugo Winckler and F. C. Andreas remind us of the word "marya" for "young man" or "hero" in the Vedic texts. So we find the same Aryan nobles in Mitanni about 1280 B. C., and very much later also in India.

If really, as it seems, the old texts state that the Amorites and the Tamehu were fair, we should thus get a historic explanation of the great number of xanthochroic people we find down to our time everywhere in Asia Minor and in Syria, and among the modern Jews.

Resuming now the thread of this paper, we have a great number of different "Moslem" Sectaries spread over a vast part of western Asia under different names, as Tahtadji, Allevi, Ali-Ullahtiya, Ansariyeh, Fellah, Kyzylbash, Yezidi, and Bektash, speaking the different languages of their orthodox neighbors, Turkish, Arabic, and Kurdish, but still absolutely homogeneous as to their somatic characteristics. And to this self-same group belong also the Druses and the Maronites. They also have the enormously high and short "planoccipital" heads and the narrow and high noses we find with the Sectaries.

Now this same hypsiccephalic⁶ element with the high aquiline noses, which forms the entire stock of all these Sectaries, we find again in Persia, and in a high percentage among the Turks and the Greeks, and in a still higher among the Armenians—everywhere under circumstances that would make it appear

⁶High-headed.

to be old and aboriginal, whilst the dolichocephals seem to represent later immigrations.

This theory, based entirely on anthropometric research, is confirmed by historic considerations and by the results of modern excavations. We now know that about 1280 B. C., when Khattusil made his peace with Rameses II, there existed a large empire, not much smaller than Germany, reaching from the Ægean Sea to Mesopotamia and from Kadesh on the Orontes to the Black Sea. We do not know at present if this Hittite Empire ever had a really homogeneous population, but we have a good many Hittite reliefs, and all these, without one single exception, show us the high and short heads or the characteristic noses of our modern brachycephalic groups.

When I first upheld in 1892, in my paper on the anthropological position of the Jews, the homogeneous character of these groups, I called them "Armenoids." But there can be no doubt that they are all descended from tribes belonging to the great Hittite Empire. So it is the type of the Hittites that has been preserved in all these groups for more than 3,000 years, and this is certainly a Jewish type, and corresponds with the old Jewish ideal of beauty as we read in the Song of Songs, vii, 4: "Thine eyes are as the pools in Heshbon, by the gate of Bath-rabbim, thy nose is like the tower of Lebanon, which looketh toward Damascus."

But this Jewish type is not Semitic and is rarely found among the only real Semites, the Bedawy. The Hittite inscriptions have not yet been read, but our orientalists are unanimous in assuming that there is not the slightest doubt that the Hittite language was not Semitic. These non-Semitic aborigines had their own language, their own writing, and their own religion. Semitic influence is completely absent in the earlier times and is perceptible only later on at different times in the different territories—first in Babylonia, then in Palestine, where Abraham is the eponymous hero of a Semitic invasion, and still later in Northern Syria. . . .

For the present population of northern Syria, as well as of all western Asia, our anthropometric tables show evidence that this old type is still extant in a high percentage among the actual inhabitants.

Only as to the primordial home of the Hittites, or however else we may term all these hypsi- and brachycephalic people with the high and narrow nose, is there some difficulty. The "Alpine race" of central Europe is certainly somehow related to or connected with them and a priori it is not easy to determine if the Hittites came from central Europe or if the "Alpine race" came from western Asia. I do not know if the first possibility has many champions left now. If so, they might certainly lay stress on the fact that the modern Armenians and the modern Persians, both typical "Hittites," are now speaking Aryan languages, but we know how often ethnic groups change their language entirely without losing their somatic type, and we can in this special case well imagine that early precursors of the xanthochroic Kurds and their relations may have brought their Aryan language to the Old

Armenians and Persians without being able to impress their somatic type upon them.

We should not forget, too, that Europe is only a small peninsular annexe to Asia, and that there are infinitely more typical "Hittites" in western Asia than there are in Europe. It seems surer, therefore, to locate the cradle of the Hittites in Asia, where we find extreme brachycephals as far to the east as Burma and Siam and the Malay Archipelago.

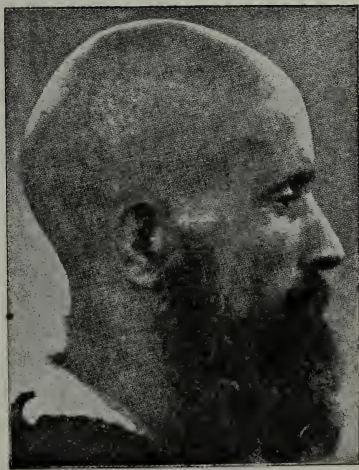
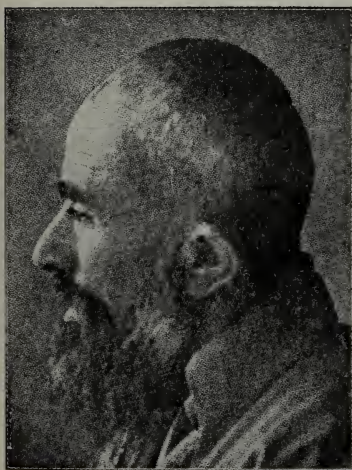
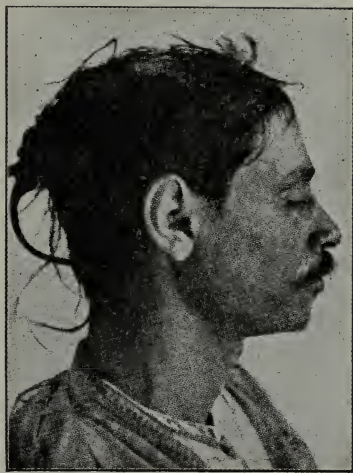
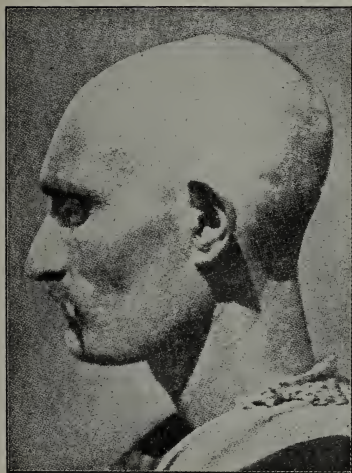
We could then also understand how the essential somatic difference between the Hittites and the other brachycephalic Asiatics—their high and narrow nose—originated as a merely accidental mutation and was then locally fixed, either by a certain tendency of taste and fashion or by long, perhaps millennial, inbreeding. The "Hittite nose" has finally become a *dominant* characteristic in the Mendelian sense, and we see it, not only in the actual geographical province of the Alpine race, but often enough also here in England. Certainly, similar noses may originate everywhere, quite independently of the Hittites, by mere mutation, but it seems safer to explain by atavism and by Asiatic or Alpine origin noses like those of the late Cardinal Newman, Ralph Waldo Emerson, or Charles Kingsley.

So, to sum up, we see how all western Asia was originally inhabited by a homogeneous, melanochroic race, with extreme hypsi-brachycephaly and with a "Hittite" nose. About 4000 B. C. began a Semitic invasion from the south-east, probably from Arabia, by people looking like modern Bedawy. Two thousand years later commenced a second invasion, this time from the north-west, by xanthochroous and long-headed tribes like the modern Kurds, half savage, and in some way or other, perhaps, connected with the historic Harri, Amorites, Tamehu, and Galatians.

The modern "Turks," Greeks, and Jews are, all three, equally composed of these three elements, the Hittite, the Semitic, and the xanthochroous Nordic. Not so the Armenians and the Persians. They, and still more the Druses, Maronites, and the smaller sectarian groups of Syria and Asia Minor, represent the old Hittite element, and are little, or not at all, influenced by the somatic characters of alien invaders.

Combinations of philology with anthropology have in former times, especially through Friedrich Müller and his school, often led to serious mistakes. One spoke of Aryan races instead of people with Aryan languages, and one went so far as to speak of Aryan skulls and of Aryan eyes, so that Max Müller formally protested against the intrusion of linguistics into ethnology, stating that one might just as well speak of a brachycephalic grammar as of an Aryan skull.

Still there is a solidarity between the historical sciences and natural history, and in proof of this solidarity I have ventured—in the spirit and in honor of Thomas Henry Huxley—to give argument and evidence.

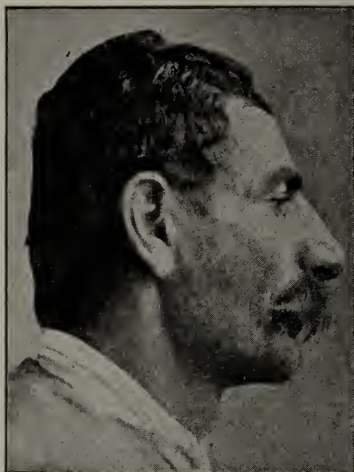


1. Kurd, Nimrud-Dagh.

2. Bedouin from near Baghdad.

3. Mohammedan, Girmeh.

4. Mohammedan, Aghlasan.



5. Greek, Levissi.

6. Armenian, Kessab, Djebel Akrah.

7. Hittite Divinity, Sendjirli, Syria.

19. THE TYPE OF THE HALF-BREED INDIAN¹

By FRANZ BOAS

There are few countries in which the effects of intermixture of races and of change of environment upon the physical characteristics of man can be studied as advantageously as in America, where a process of slow amalgamation between three distinct races is taking place. Migration and intermarriage have been a fruitful source of intermixture in the Old World, and have had the effect of effacing strong contrasts in adjoining countries. While the contrasts between European, negro, and Mongol are striking, their territories are connected by broad stretches of land which are occupied by intermediate types. For this reason there are only few places in the Old World in which the component elements of a mixed race can be traced to their sources by historical methods. In America, on the other hand, we have a native race which, although far from being uniform in itself, offers a marked contrast to all other races. Its affiliations are closest toward the races of Eastern Asia, remotest to the European and negro races. Extensive intermixture with these foreign races has commenced in recent times. Furthermore, the European and African have been transferred to new surroundings on this continent, and have produced a numerous hybrid race, the history of which can also be traced with considerable accuracy. We find, therefore, two races in new surroundings and three hybrid races which offer a promising subject for investigation: the Indian-white, the Indian-negro, and the negro-white. The following study is devoted to a comparison of the Indian race with the Indian-white hybrid race.

It is generally supposed that hybrid races show a decrease in fertility, and are therefore not likely to survive. This view is not borne out by statistics of the number of children of Indian women and of half-blood women. The average number of children of five hundred and seventy-seven Indian women and of one hundred and forty-one half-blood women more than forty years old is 5.9 children for the former and 7.9 children for the latter. It is instructive to compare the number of children for each woman in the two groups. While about ten per cent. of the Indian women have no children, only 3.5 per cent. of the half-bloods are childless. The proportionate number of half-bloods who have one, two, three, four, or five children is smaller than the corresponding number of Indian women, while many more half-blood women

¹From Franz Boas, "The Half-Blood Indian: An Anthropometric Study," *Popular Science Monthly*, pages 761-770, October, 1894.

than full-blood women have had from six to thirteen children. This distribution is shown clearly in Fig. 1, which represents how many among each one hundred women have a certain number of children. The facts disclosed by this tabulation show that the mixed race is more fertile than the pure stock. This can not be explained by a difference of social environment, as both groups live practically under the same conditions. It also appears that the small increase of the Indian population is almost entirely due to a high infant mortality, as under better hygienic surroundings an average of nearly six children would result in a rapid increase. It is true, however, that a decrease of infant mortality might result in a decreased birth rate.

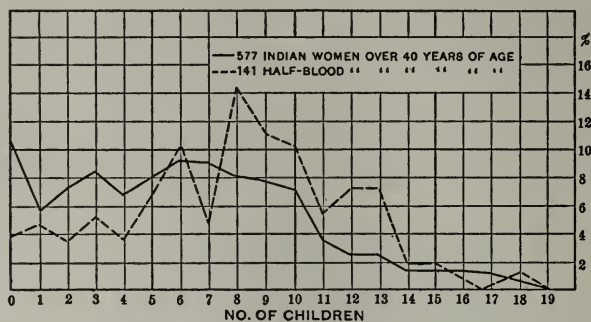


Fig. 1. Number of Children of Indian Women and of Half-blood Women.

Among the Indians of the Pacific coast the infant mortality is also very great, but we find at the same time a still larger proportion of women who bear no children.

It is of some interest to note the average number of children of women of different ages as indicating the growth of families. Among the Indians there is an average interval of four years and a half—as shown in the following table—which, however, must not be confounded with an average interval between births:

- Indian women 20 years of age have on the average 1 child.
- Indian women 25 years of age have on the average 2 children.
- Indian women 28 years of age have on the average 3 children.
- Indian women 33 years of age have on the average 4 children.
- Indian women 38 years of age have on the average 5 children.

Among the half bloods the interval is shorter, but the number of available observations is insufficient for carrying out the comparison in detail.

The statures of Indians and half bloods show differences which are also in favor of the half bloods. The latter are almost invariably taller than the

former, the difference being more pronounced among men than among women. The white parents of the mixed race are mostly of French extraction, and their statures are on an average shorter than those of the Indians. We find, therefore, the rather unexpected result that the offspring exceed both parental forms in size. This curious phenomenon shows that size is not inherited in such a manner that the size of the descendant is intermediate between those of the parents, but that size is inherited according to more intricate laws.

From investigations carried on among whites we know that stature increases under more favorable surroundings. As there is no appreciable difference between the social or geographical surroundings of the Indians and of the half bloods, it seems to follow that the intermixture has a favorable effect upon the race.

The difference in favor of the half blood is a most persistent phenomenon, as may be seen by a glance at the following table:

DIFFERENCES OF AVERAGE STATURES OF INDIANS AND HALF BLOODS

Tribes	Men, centimetres	Women, centimetres
Eastern Ojibwa.....	—0.1	0.0
Omaha.....	0.0	—0.7
Blackfeet.....	0.1	.....
Micmac.....	0.6	—0.2
Sioux.....	1.0	0.9
Delaware.....	1.6	0.4
Ottawa.....	1.7	0.4
Cree.....	2.0	2.8
Eastern Cherokee.....	3.2	.....
Western Ojibwa.....	3.2	0.7
Chickasaw.....	4.5	.....
Choctaw.....	7.0	.....
Tribes of medium stature (165 to 169 centimeters).....	3.3	2.5
Shortest tribes (less than 165 centimeters)....	8.3	14.8

The last two entries in this table embrace mainly the Indians of the Southwest and of the Pacific coast.

The facts which appear so clearly in the preceding table may be brought out in a different manner by grouping all the Indian tribes according to their statures in three classes: those measuring more than 169 centimeters, or tall tribes; those measuring from 165 to 169 centimeters, or tribes of medium stature; and those measuring less than 165 centimeters, or short tribes. The frequencies of various statures in each of these classes have been plotted in Fig. 2. The horizontal line represents the individual statures from the lowest

to the highest. The vertical distance of the curves from any point of the horizontal line shows how many among each one hundred individuals have the stature represented by that particular point. Thus it will be seen that 14.4

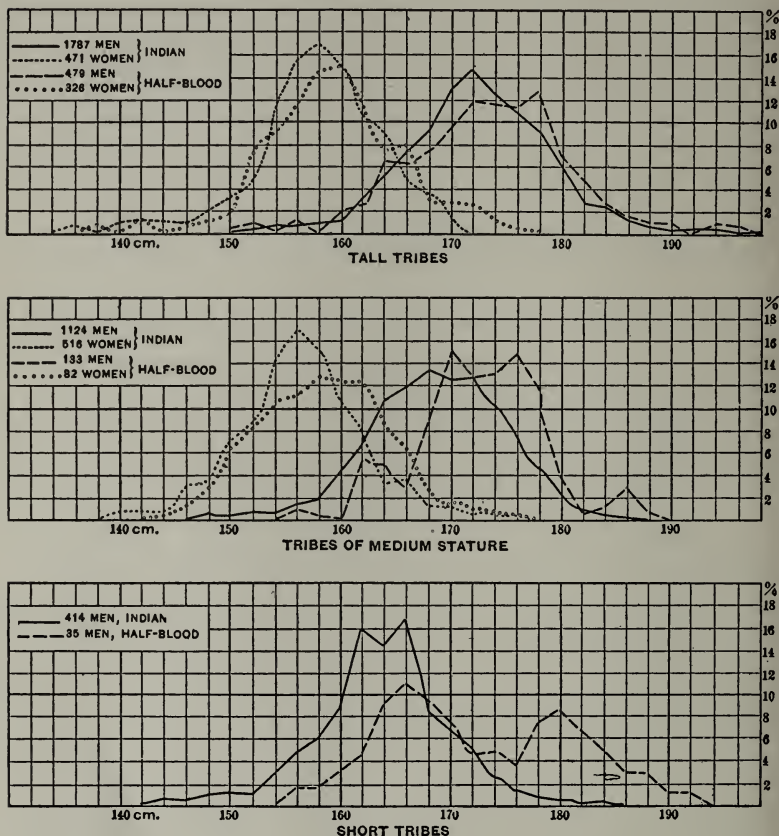


Fig. 2. Statures of Indians and of Half-Bloods.

per cent. of the full blood men of the tallest class have a stature of 172 centimeters, while only 12.3 per cent. of the half blood of the same class have the most frequent stature, belonging to them—namely, 178 centimeters. Among the Indian women of the full-blood tribes 16.8 per cent. have a stature of 158 centimeters, while only 14.4 per cent. of the half bloods have their most frequent stature—namely, 160 centimeters.

This tabulation brings out the peculiarity that the statures of the half bloods are throughout higher than those of the full bloods; and that, at the same time, the most frequent statures are more frequent among the pure race than in the mixed race. This is expressed by the fact that the curves illustrating the distribution of statures among the half bloods are flatter than those illustrating the same feature among full bloods. This peculiarity may be noticed in all the curves of Fig. 2, with the exception of that of the men of the second group.

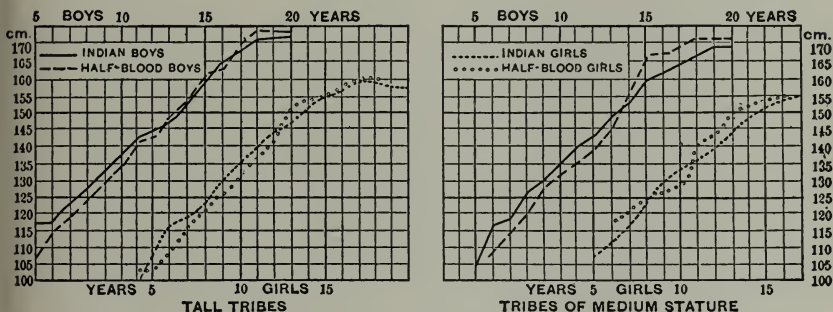


Fig. 3. Growth of Indian and Half-blood Children.

The statures near the average of each group are most frequent, and as these values do not occur as often among the half bloods as among the full bloods, the values which are remote from the average are at the same time relatively more frequent. Thus it becomes apparent that the mixed race is less homogeneous than the Indian race.

Another important phenomenon is revealed by a comparison of the growth of Indians and half bloods (Fig. 3). When the average statures of children of both races are compared, it appears that during the early years of childhood the Indian is taller than the half blood, and that this relation is reversed later on. This is found in both the groups for tall tribes and for tribes of medium stature. It is to be regretted that this comparison can not be carried on for whites also. The social surroundings of the white child are, however, so entirely different from those of the Indian and of the half-blood children that no satisfactory conclusions can be drawn from a comparison. It is difficult to see why the laws of growth of the Indian and half blood should differ in this manner; why the Indian child at the age of three years should be taller than the half-blood child, and then develop more slowly than the latter. This peculiarity is most striking in the growth of the tribes of medium stature, as in this case the difference in the statures of adults is so considerable. Unfortunately we do not know if the same difference prevails at the time of birth;

but even if this were the case the difference in the rate of growth would remain mysterious. The various phenomena described here merely emphasize the fact that the effect of intermixture is a most complicated one, and that it acts upon physiological and anatomical qualities alike. We observe in the mixed race that the fertility and the laws of growth are affected, that the variability of the race is increased, and that the resultant stature of the mixed race exceeds that of both parents.

20. THE EFFECTS OF RACIAL MISCEGENATION¹

By EARL FINCH

It is well known that whenever two races occupy the same geographical area a mixed population arises; in fact, such a large percentage of the world's population has come into existence by race crossing that the character of the product is as important for social welfare as it is interesting for the anthropologist and sociologist. The question gains added importance in the present era of colonial expansion from the increasing contact of the European with the dark-skinned populations of the tropics, with whom he has never hesitated to mingle his blood. The question, however, has been so generally approached from the side of philosophic doctrine, rather than from the side of objective study, that there is the greatest possible divergence between the conclusions of those who presume to speak with authority. The followers of Gobineau, in France, and Morton, in America, have maintained that racial intermixture has had and can have only disastrous consequences. At the other extreme are those who preached the gospel of amalgamation in the United States, during and after the Civil War, maintaining that intermixture between races so dissimilar as the whites and negroes would prove beneficial. It is the object of the writer to present some facts tending to prove that race blending, especially in the rare instances when it occurs under favorable circumstances, produces a type superior in fertility, vitality, and cultural worth to one or both of the parent stocks.

The superiority of the mixed people to the native stock in fertility and vitality is shown by their persistence, sometimes in the very locality in which the native race, in contact with foreigners, has declined or disappeared. When Tasmania was colonized the native population was roughly estimated at 7000. The policy of extermination pursued by the colonists had reduced the aborigines to 120 in 1832. These were removed to Flinder's Island, but although the locality is healthy they had declined in 1847 to 14 men, 22 women, and 10 children. These were removed in 1847 to Oyster Cove in the southern part of Tasmania, but they declined so rapidly that only three elderly women survived in 1869, the last of whom died in 1876. The rapid decline of the Maoris and Australians is well known. The native population of the Hawaiian Islands, estimated at 300,000 when Cook discovered the islands in 1778, had declined to 29,787 in 1900.

¹Papers on Inter-racial Problems, edited by G. Spiller, pages 108-112, 1911.

It was apparent, however, even in the time of Darwin, that a cross between the native stock and a civilized race gives rise to a progeny capable of existing and multiplying in spite of changed conditions. Between 1866 and 1872 the native Hawaiians decreased by 8081, while the half-breeds increased by 8472. Between 1890 and 1900 the Hawaiians of full blood decreased from 34,436 to 29,787, while those of mixed blood increased from 6186 to 7848.

Quatrefages wrote that "the Polynesian Islanders disappear with a terrible rapidity, whilst their mixed races, and even pure-blooded Europeans, show a redoubled fertility." Although the American Indian tends to decline in the presence of European civilization, the products of the blending of Negroes, Spanish, and Portuguese with the Indian, form a large fraction of the population of the southern part of the Western Hemisphere. The Griquas of South Africa, descendants of Dutch and Hottentots, have prospered and multiplied, while the pure Hottentots have rapidly decreased. Even after making due allowance in all these cases for the increase due to the birth of half-breeds of the first generation, the superior fertility and vitality of the mixed population are evident.

Pitcairn Island was settled in 1790 by nine English mutineers, six Tahitian men, and fifteen Tahitian women. In 1808 only white men and eight or nine women and children were left. But the first half-breeds grew up, intermarried, and had numerous children. In 1855 the population had increased to 200. After removing to Norfolk Island in 1856 they increased so rapidly that, although sixteen returned to Pitcairn in 1859, they numbered 300 in 1868; in 1905 the population of Norfolk Island was 1059, a majority of whom were descendents of the mutineers. The present population of Pitcairn Islands is flourishing. Emily L. McCoy, a direct descendant of one of the mutineers, writes: "We have good constitutions, though so closely related, and we are as healthy and active from childhood to old age as people can well be." The remarkable increase of the half-breeds of Pitcairn and Norfolk Islands, more rapid than the increase of the population of England, is in striking contrast with the rapid decline of the Tasmanians, Maoris, and Australians.

Facts in favor of the view that mulattoes are not fertile are so eagerly sought that the large body of evidence, tending to prove the exact opposite, is ignored. An eminent authority in the United States argues that the decrease of intercourse between whites and negroes in the Southern states is causing a decrease in the number of mulattoes and a perceptible return to the pure African type. But the census shows that there has been a more rapid increase among mulattoes than among negroes of the purer type, during this very period of decreasing intercourse.

Although it is probable that the decrease of race crossing in the United States is often overestimated, there are conditions unfavorable to the perpetuation of the mulatto type. There is a tendency for the mixed population to disappear by marrying into the darker race, or by identifying themselves with the white. The strenuous attempt to bar negroes from participation in

the privileges of democratic society leads many of the proscribed class, whose negro blood cannot be detected, to affiliate with the favored race by settling in localities where they are unknown. The rapid increase of mulattoes under these conditions is strong evidence that they are not inferior in fertility or virility to either of the parent stocks. The colored people in Jamaica persist as a fairly well-marked type, although their number is hardly one-fourth that of the blacks, while the white population is so small that no large number of mixed people can be added by race crossing. The mulatto class persists in Haiti, although they form only ten per cent. of the population, and the number of whites is negligible. The mixed population of Santo Domingo increases rapidly, although the number born from crossing with any pure stock is very small.

Percentage of mulattoes in total negro population:

	1890	1870
Continental United States.....	15.2	12
North Atlantic Division.....	23.2	17.3
South Atlantic Division.....	13.4	10.4
North Central Division.....	31	22.3
South Central Division.....	14	11.8
Western Division.....	39.2	35.6

It is extremely difficult for the mixed class to demonstrate their cultural worth because of the deplorable conditions under which the mixed populations come into existence. Most race crossing has occurred on the outskirts of civilization, and the half-breeds, despised by one race and despising the other, have been outcasts from society. The victims of prejudice and social ostracism are certain to display some bad qualities; yet, despite these untoward circumstances, there is a large body of evidence of the superior energy and mental vigor produced by the race crossing. The greater number of negroes who have achieved distinction in the United States have been men of mixed blood. Many of the purer type have manifested remarkable intellectual power, yet it is probably more than coincidence that Douglas, Washington, and DuBois, who have attained the height of group leadership, have been mulattoes; superior, moreover, to both the whites and blacks in their ancestry. The mulattoes of Haiti form a large percentage of the aristocracy, and are very prominent in commerce, in the professions, and in state affairs. The colored people of Jamaica constitute a majority of those engaged in the trades and professions. Sir Sydney Olivier considers that this class of mixed race is indispensable to any West Indian community, because it saves the community from the cleavage between white and black, and helps to form an organic whole. Quatrefages believed that the half-breed of the negro and European, when placed under normal conditions, justifies the words of the old traveller, Thevenot: "The mulatto can do all that the white man can do; his intelligence

is equal to ours." If the mulatto is not superior in fertility, the rapidly declining birth-rate of the white nations may soon give him this significant advantage.

It is not surprising that racial miscegenation often produces an inferior population. The withholding of social and legal sanction from inter-racial marriages tends to limit unions to the lower classes, the offspring of which are like the parents. But the results are likely to be advantageous if the crossing occurs under favorable conditions. "The Ainos of Japan, who are vanishing by amalgamation, are a very different and more primitive type than the Japanese, and both appear to be benefited by the process of absorption. The Portuguese and the Dutch have been intermarrying for several centuries in farther India to the advantage of both races, as is true of the Russians with the older natives of Siberia. The mixture of Arabs and the North Africans has produced the Moors; many crossings of the Turks, the mixture of the Spaniards and Indians in South America and Mexico, especially in Chile, which have resulted in Neo-Indian and Neo-Aryan types, show how favorably the crossing of races may act if differences are not great and if both sexes of both races marry with each other instead of only the men of one with the women of the other." In the province of Saint Paul, Brazil, Portuguese and inhabitants of the Azores have intermarried with the native Gayanazes and Carijos. From the first, unions were regularly contracted among them, and the offspring were accepted as the equals of the pure whites. From these unions has sprung a race as noted for remarkable moral development as for intellectual power and for strength, beauty, and courage.

Crossing was accomplished under normal conditions in Saint Paul because of favorable social sentiment; approximately normal conditions prevailed at Pitcairn, because of geographical isolation. The Paulists appear to be equal, if not superior, to the most advanced of the parent stocks, while few will deny that the Pitcairn Islanders are superior to their Tahitian mothers and their English fathers.

While race blending is not everywhere desirable, yet the crossing of distinct races, especially when it occurs with social sanction, often produces a superior type; certainly such crossing as has occurred tends to prove absurd the conclusion that the dilution of the blood of the so-called higher races by that of the so-called lower races will either set the species on the highway to extinction, or cause a relapse into barbarism.

21. RACIAL DIFFERENCES IN MENTAL TRAITS¹

By R. S. WOODWORTH

One of the most agreeable and satisfying experiences afforded by intellectual pursuits comes from the discovery of a clean-cut distinction between things which are superficially much alike. The esthetic value of such distinctions may even outweigh their intellectual value and lead to sharp lines and antitheses where the only difference that exists is one of degree. A favorite opportunity for this form of intellectual exercise and indulgence is afforded by the observation of groups of men. The *type* of man composing each group—that is what we should like to find; and we hear much of the “typical” scientist, the typical business man, the typical Englishman or Frenchman, the typical southerner, the typical Bostonian. The type of any group stands as a sort of ideal within the group, and, more or less caricatured, as the butt of the wit of other groups. There is one peculiar fact about these types: you may have to search long for an individual who can be taken as a fair example. And when you have at last found the typical individual, you may be led to ask by what right he stands as the type of the group, if he is a rarity amidst it.

If we would scientifically determine the facts regarding a group of men, we should, no doubt, proceed to examine all the individuals in the group, or at least a fair and honest representation of them. The first fact that meets us when we proceed in this way is that the individuals differ from each other, so that no one can really be selected as representing the whole number. We do find, indeed, when we measure the stature or any other bodily fact, or when we test any native mental capacity, that the members of a natural group are disposed about an average, many of them lying near the average, and few lying far above or far below it; and we thus have the average as a scientific fact regarding the group. But the average does not generally coincide with the type, as previously conceived, nor do the averages of different groups differ so much as the so-called types differ. Moreover, the average is itself very inadequate, since it does not indicate the amount of variation that exists within the group—and this is one of the most important facts to be borne in mind in understanding any collection of individuals. It is especially important in comparing different groups of men, since the range of variation within either group is usually much greater than the difference between the averages

¹From address of the vice-president and chairman of Section H—Anthropology and Psychology—of the American Association for the Advancement of Science, Boston, 1909. *Science*, pages 171–186, Feb. 4, 1910.

of the groups. The groups overlap to such an extent that the majority of the individuals composing either group might perfectly well belong to the other.

No doubt statements like this will be readily accepted as far as concerns the different nations belonging to the same race. One could not seriously doubt that the nations of Europe, though they might differ slightly on the average, would so much overlap one another that, except for language and superficial mannerisms, the great majority of the members of one nation might be exchanged with a majority from another nation without altering the characteristics of either. But when we extend our view to all the peoples of the earth, the case would at first appear quite changed. Certainly whites and negroes do not overlap, to any extent, in color of skin, nor negroes and Chinamen in kinkiness of hair, nor Indians and Pygmies in stature. Such specialization of traits is, however, the exception. Whites and negroes, though differing markedly in complexion and hair, overlap very extensively in almost every other trait, as, for example, in stature. Even in brain weight, which would seem a trait of great importance in relation to intelligence and civilization, the overlapping is much more impressive than the difference; since while the brain of negroes averages perhaps two ounces lighter than the brain of Europeans, the range of variation within either race amounts to twenty-five ounces.

Our inveterate love for types and sharp distinctions is apt to stay with us even after we have become scientific, and vitiate our use of statistics to such an extent that the average becomes a stumbling-block rather than an aid to knowledge. We desire, for example, to compare the brain weights of whites and of negroes. We weigh the brains of a sufficient number of each race—or let us at least assume the number to be sufficient. When our measurements are all obtained and spread before us, they convey to the unaided eye no clear idea of a racial difference, so much do they overlap. If they should become jumbled together, we should never be able to separate the negroes from the whites by aid of brain weight. But now we cast up the average of each group, and find them to differ; and though the difference is small, we straightway seize on it as the important result, and announce that the negro has a smaller brain than the white. We go a step further, and class the white as a large-brained race, the negro as a small-brained. Such transforming of differences of degree into differences of kind, and making antitheses between overlapping groups, partakes not a little of the ludicrous. . . .

All in all, the discovery of true inherent differences between races and peoples is an intricate task, and if we now turn to the psychologist to conduct an examination of different groups, and to inform us regarding their mental differences, we must not allow him to present a hasty conclusion. His tests must be varied and thorough before we can accept his results as a serious contribution to this difficult subject. The psychologist may as well admit at once that he has little to offer; for, though the "psychology of peoples" has become a familiar phrase, and though books have been written on the subject, actual experimental work has so far been very limited in quantity. . . .

First, as to the senses. The point of special interest here is as to whether the statements of many travelers, ascribing to the "savage" extraordinary powers of vision, hearing and smell, can be substantiated by exact tests. The common opinion, based on such reports, is, or has been, that savages are gifted with sensory powers quite beyond anything of which the European is capable; though Spencer explains that this is a cause of inferiority rather than the reverse, because the savage is thus led to rely wholly on his keen senses, and to devote his whole attention to sense impressions, to the neglect and atrophy of his intellectual powers. Ranke, however, on testing natives of Brazil, a race notable for its feats of vision, found that their ability to discern the position of a letter or similar character at a distance, though good, was not remarkable, but fell within the range of European powers. The steppe-dwelling Kalmuks, also renowned for distant vision, being able to detect the dust of a herd of cattle at a greater distance with the naked eye than a European could with a telescope, have also been examined; and their acuity was indeed found to be very high, averaging considerably above that of Europeans; yet only one or two out of the forty individuals tested exceeded the European record, while the great majority fell within the range of good European eyes. Much the same result has been obtained from Arabs, Egyptians and quite a variety of peoples. Among the most reliable results are those of Rivers on a wholly unselected Papuan population. He found no very exceptional individual among 115 tested, yet the average was somewhat better than that of Europeans. I had myself, through the kindness of Dr. McGee, the opportunity of testing individuals from quite a variety of races at the St. Louis Fair in 1904, and my results agree closely with those already cited, though I did not find any cases of very exceptional powers among about 300 individuals. There were a number who exceeded the best of the 200 whites whom I also tested under the same conditions, but none who exceeded or equaled the record of a few individuals who have been found in the German army. Indians and Filipinos ranked highest, averaging about 10 per cent. better than whites, when all individuals of really defective vision were excluded. The amount of overlapping is indicated by stating that 65-75 per cent. of Indians and Filipinos exceeded the average for whites. It did not seem possible, however, to assert anything like a correspondence between eyesight and the degree of primitiveness or backwardness of a people; since, for instance, the Negritos of the Philippine Islands, though much more primitive than the Malayan Filipinos in their mode of life, and, indeed, the most primitive group so far tested, were inferior to the Filipinos, and, in fact, as far as could be judged from the small number examined, no whit superior to whites. Nor does it seem possible, from results hitherto reported, to believe in a close correspondence between keen sight and dark skin, though it is true that pigment is important in several ways to the eye, and that therefore, as Rivers has suggested, the amount of pigmentation might be a factor in vision. But it does not seem to be specially the darkest races that show the keenest vision. We may perhaps

conclude that eyesight is a function which varies somewhat in efficiency with difference of race, though with much overlapping. No doubt, however, the results as they stand need some qualification. On the one hand, inclusion of individuals with myopia and similar defects would lower the average of Europeans considerably more than that of most other races; so that the actual condition of eyesight differs more than the results show. On the other hand, it would not be fair to include near-sighted individuals, if what we wish to discover is native differences between peoples; for the different prevalence of myopia is certainly due to the differing uses to which the eye is put. And this matter of use may have considerable influence on the individuals not classed as near-sighted, and so admitted to the comparison. Rivers has made an observation in connection with the test for eyesight, which I am able to confirm, and which is perhaps of much importance. He found that when the letter or character used in his test, the position of which had to be recognized at the greatest possible distance, was removed from him beyond the distance at which he felt that he could judge it, he could still guess it right nearly every time, though without confidence. By such guessing, one's record in this test can be bettered considerably; and careful study enables one to see the slight and blurred indications of position which form the basis of the guessing. Now it may well be that the occupations of civilized life breed a habit of depending on clear vision, whereas the life of those who must frequently recognize objects at a great distance breeds reliance on slight indications, and so creates a favorable attitude for the test of eyesight. When this possibility is taken in connection with the deterioration of many European eyes from abuse, and in connection with the observed overlapping of all groups tested, the conclusion is not improbable that, after all, the races are essentially equal in keenness of vision. Even if small differences do exist, it is fairly certain that the wonderful feats of distant vision ascribed to savages are due to practice in interpreting slight indications of familiar objects. Both Rivers and Ranke, on testing some of the very individuals whose feats of keen sight seemed almost miraculous, found that, as tested, they had excellent but not extraordinary vision. A little acquaintance with sailors on shipboard is enough to dispel the illusion that such feats are beyond the powers of the white man.

The hearing of savages enjoys a reputation, among travelers, similar to that of their sight; but there can be little doubt that the case is the same. In fact, the tests which have so far been made tend to show that the hearing of whites is superior. Such was the result of Myers on the Papuans, and of Bruner in his extensive series of measurements made at the St. Louis Fair. Only 15 per cent. of 137 Filipinos tested did as well as the average of whites; other groups made a somewhat better showing, but all seemed inferior on the average to whites. In spite of the experimental results, there is perhaps reason to doubt that the hearing of whites is essentially and natively much superior to that of other races. Civilized life protects the ear from some forms of injury to which it is exposed in more primitive conditions; and, then, the

question of cleanliness must be considered in regard to the meatus. Besides, the ear is known to be highly susceptible of training in the perception of particular sorts of sound—as overtones and difference tones—and it is likely enough that the watch ticks and similar clicks used in the tests are not equally within the repertory of all peoples.

Much the same can be said regarding keenness of smell. On account of the high olfactory powers of dogs and some other lower animals, it has often seemed natural and proper that this sense should be highly developed among savages; and feats of primitive folk have been reported quite analogous to those already referred to under sight and hearing. No doubt here again, special interests and training are responsible, since what few tests have been made tend to show no higher acuity of smell among negroes and Papuans than among Europeans.

The sense of touch has been little examined. McDougall found among the Papuans a number with extremely fine powers of discrimination by the skin. The difference between two points and one could be told by these individuals even when the two points were brought very close together; on the average, the Papuans tested excelled Europeans considerably in this test. On the other hand, Indians and Filipinos, and a few Africans and Ainu, tested in the same manner, seem not to differ perceptibly from whites.

The pain sense is a matter of some interest, because of the fortitude or stolidity displayed by some races towards physical suffering. It may be, and has been conjectured, that the sense for pain is blunt in these races, as it is known to be in some individuals who have allowed themselves to be burned without flinching, and performed other feats of fortitude. The pain sense is tested by applying gradually increasing pressure to some portion of the skin, requiring the person tested to indicate when he first begins to feel pain. Now, as a matter of fact, the results of McDougall on the Papuans, and those of Dr. Bruner and myself on Indians, Filipinos, Africans and Ainu, are in close agreement on this point. Greater pressure on the skin is needed to produce pain in each of these races than in whites. This is the average result, but in this test the distribution of the cases is specially important. Though most whites feel pain at or about a certain small pressure, there is quite a respectable minority who give no sign till much higher pressures are reached, their results corresponding very closely to those of the majority of Indians. And similarly, a minority of Indians feel pain at much lower pressures than the bulk of their fellows, falling into the ranks of the white man. In each group, the distribution is bimodal, or aggregated about two points instead of one; but whites are principally aggregated about the lower center, and Indians and other races about the higher center. Introspection comes to our aid in explaining this anomaly, for it shows that there is some difficulty in telling just when the pressure becomes painful. If one is satisfied with slight discomfort, a moderate pressure will be enough; but if a sharp twinge is demanded, the pressure must be considerably increased. Most whites, under the conditions of the test, are

satisfied with slight discomfort, while my impression in watching the Indians was that they were waiting to be really hurt. The racial difference would accordingly be one in the conception of pain, or in understanding the test, rather than in the pain sense.

On the whole, the keenness of the senses seems to be about on a par in the various races of mankind. Differences exist among the members of any race, and it is not improbable that differences exist between the averages of certain groups, especially when these are small, isolated and much inbred. Rivers has in fact found such small groups differing considerably from whites in the color sense. One such group showed no cases of our common color blindness or red-green blindness, while another group showed an unusually large percentage of color-blind individuals. In the larger groups, the percentage of the color-blind is, very likely, about constant, though the existing records tend to show a somewhat lower proportion among Mongolians than among whites. Very large numbers of individuals need, however, to be tested in order to determine such a proportion closely; even among Europeans, the proportion can not yet be regarded as finally established. One thing is definitely shown by the tests that have been made for color blindness in various races: no race, however primitive, has been discovered in which red-green blindness was the universal or general condition; and this is a fact of some interest in connection with the physiology of color vision, for it seems probable that red-green blindness, since it is not by any means a diseased condition, represents a reversion to a more primitive state of the color sense. If this is so, no race of men remains in the primitive stages of the evolution of the color sense; the development of a color sense substantially to the condition in which we have it, was probably a prehuman achievement.

In the actual history of the discussion of the color sense in various races, quite a different view of the evolution has been prominent. It was Gladstone who first, as an enthusiastic student of Homer, was struck by the poverty of color names in ancient literature, and who suggested that the Greeks of the Homeric age had a very imperfectly developed eye for color. He was especially impressed by the application of the same color name to blue and to gray and dark objects. Geiger, adhering to the same sort of philological evidence, broadened its scope by pointing out the absence of a name for blue in other ancient literatures. It is indeed curious that the sky, which is mentioned hundreds of times in the Vedas and the Old Testament, is never referred to as blue. The oldest literatures show a similar absence of names for green. Geiger found that names for black, white and red were the oldest, and that names for yellow, green and blue have appeared in that order. He concluded that the history of language afforded an insight into the evolution of the color sense, and that, accordingly, the first color to be sensed was red, the others following in the same order in which they occur in the spectrum. Magnus found that many languages at the present day were in the same condition as that shown in the ancient Greek, Hebrew and Sanscrit. Very many, perhaps

the majority, have no specific name for blue, and a large proportion have none also for green. A smaller number are without a name for yellow, while nearly all have a name for red. It seemed that the backward races of today had just reached the stage, in the matter of color sensation, which was attained by other races some thousands of years ago. The underlying assumptions of this argument are interesting—the notion that the list of sensations experienced by a people must find expression in its vocabulary; and the conception of certain peoples now living as really primitive. Fortunately, Magnus submitted this theory to the test of facts, by supplying travelers and traders with sets of colors, by which various peoples were tested, first, as to their ability to name the colors in their own languages, and second, as to their power to recognize and distinguish the colors. The results of this inquiry were that names were often lacking for blue and green, but that every people was able to perceive the whole gamut of colors known to the European. This was a severe blow alike to the philological line of argument and to the ready assumption that early stages of evolution were to be found represented in the backward peoples of today. Accepting the facts as they stood, Magnus still felt that there must be some physiological or sensory reason for the curious lack of certain color names in many languages; and he therefore suggested that blue and green might be less vividly presented by the senses of many tribes, and that, being duller to their eyes than to Europeans, these colors did not win their way into the language. The theory was, however, practically defunct for many years till Rivers recently took it up, as the result of tests on several dark-skinned peoples. His test called for the detection of very faint tints of the various colors, and the result was that, as compared with two score educated English whom he also tested, these peoples were somewhat deficient in the detection of faint tints of blue—and also of yellow—but not of red. One group, indeed, was superior to the English in red. The results made it seem probable to Rivers that blue was indeed a somewhat less vivid color to dark-skinned races than to Europeans, and he suggested that pigmentation, rather than primitiveness, might be the important factor in producing this difference. A blue-absorbing pigment is always present in the retina, and the amount of it might very well be greater in generally pigmented races. The suggestion is worth putting to a further test; but, meanwhile, the difference obtained by Rivers in sensitiveness to blue needs to be received with some caution, since the Europeans on whose color sense he relies for comparison were rather few in number, educated and remarkably variable among themselves. We were able, at St. Louis, to try on representatives of a number of races a difficult color matching test, so different indeed from that of Rivers that our results can not be used as a direct check on his; with the result that all other races were inferior to whites in their general success in color matching, but that no special deficiency appeared in the blues. We also could find no correlation between ill success in this test and the degree of pigmentation. On the whole, the color sense is probably very much the same all over the world.

That linguistic evidence is a very treacherous guide to the sensory powers of a people is well seen in the case of smell. Certainly many odors are vivid enough, yet we have no specific odor names. Only a psychologist would require a complete vocabulary of sensations; practical needs lead the development of language in quite other directions.

When we turn from the senses to other functions, the information which the psychologist has to offer becomes even more scanty.

Some interest attaches to tests of the speed of simple mental and motor performances, since, though the mental process is very simple, some indication may be afforded of the speed of brain action. The reaction time test has been measured on representatives of a few races, with the general result that the time consumed is about the same in widely different groups. The familiar "tapping test," which measures the rate at which the brain can at will discharge a series of impulses to the same muscle, was tried at St. Louis on a wide variety of folk, without disclosing marked differences between groups. The differences were somewhat greater when the movement, besides being rapid, had to be accurate in aim. The Eskimos excelled all others in this latter test, while the poorest record was made by the Patagonians and the Cocopa Indians—which groups were, however, represented by only a few individuals. The Filipinos, who were very fully represented, seemed undeniably superior to whites in this test, though, of course, with plenty of overlapping.

The degree of right-handedness has been asserted to vary in different races, and the favoring of one hand has been interpreted as conducive to specialization and so to civilization. We were, however, unable to detect any marked difference in the degree of right-handedness in different races, as tested by the comparative strength, quickness or accuracy of the two hands. The Negritos, the lowest race examined, had the same degree of right-handedness as Filipinos, or Indians, or whites.

We are probably justified in inferring from the results cited that the sensory and motor processes, and the elementary brain activities, though differing in degree from one individual to another, are about the same from one race to another.

Equitable tests of the distinctly intellectual processes are hard to devise, since much depends on the familiarity of the material used. Few tests of this nature have as yet been attempted on different races.

There are a number of illusions and constant errors of judgment which are well-known in the psychological laboratory, and which seem to depend, not on peculiarities of the sense organs, but on quirks and twists in the process of judgment. A few of these have been made the matter of comparative tests, with the result that peoples of widely different cultures are subject to the same errors, and in about the same degree. There is an illusion which occurs when an object, which looks heavier than it is, is lifted by the hand; it then feels, not only lighter than it looks, but even lighter than it really is. The contrast between the look and the feel of the thing plays havoc with the judgment.

Women are, on the average, more subject to this illusion than men. The amount of this illusion has been measured in several peoples, and found to be, with one or two exceptions, about the same in all. Certain visual illusions, in which the apparent length or direction of a line is greatly altered by the neighborhood of other lines, have similarly been found present in all races tested, and to about the same degree. As far as they go, these results tend to show that simple sorts of judgment, being subject to the same disturbances, proceed in the same manner among various peoples; so that the similarity of the races in mental processes extends at least one step beyond sensation.

The mere fact that members of the inferior races are suitable subjects for psychological tests and experiments is of some value in appraising their mentality. Rivers and his collaborators approached the natives of Torres Straits with some misgivings, fearing that they would not possess the necessary powers of sustained concentration. Elaborate introspections, indeed, they did not secure from these people, but, in any experiment that called for straightforward observation, they found them admirable subjects for the psychologist. Locating the blind spot, and other observations with indirect vision, which are usually accounted a strain on the attention, were successfully performed. If tests are put in such form as to appeal to the interests of the primitive man, he can be relied on for sustained attention. Statements sometimes met with to the effect that such and such a tribe is deficient in powers of attention, because, when the visitor began to quiz them on matters of linguistics, etc., they complained of headache and ran away, sound a bit naïve. Much the same observations could be reported by college professors, regarding the natives gathered in their class rooms.

A good test for intelligence would be much appreciated by the comparative psychologist, since, in spite of equal standing in such rudimentary matters as the senses and bodily movement, attention and the simpler sorts of judgment, it might still be that greater differences in mental efficiency existed between different groups of men. Probably no single test could do justice to so complex a trait as intelligence. Two important features of intelligent action are quickness in seizing the key to a novel situation, and firmness in limiting activity to the right direction, and suppressing acts which are obviously useless for the purpose in hand. A simple test which calls for these qualities is the so-called "form test." There are a number of blocks of different shapes, and a board with holes to match the blocks. The blocks and board are placed before a person, and he is told to put the blocks in the holes in the shortest possible time. The key to the situation is here the matching of blocks and holes by their shape; and the part of intelligence is to hold firmly to this obvious necessity, wasting no time in trying to force a round block into a square hole. The demand on intelligence certainly seems slight enough; and the test would probably not differentiate between a Newton and you or me; but it does suffice to catch the feeble-minded, the young child, or the chimpanzee, as any of these is likely to fail altogether, or at least to waste much time in random moves

and vain efforts. This test was tried on representatives of several races, and considerable differences appeared. As between whites, Indians, Eskimos, Ainus, Filipinos, and Singhalese, the average differences were small, and much overlapping occurred. As between these groups, however, and the Igorot and Negrito from the Philippines and a few reputed Pygmies from the Congo, the average differences were great, and the overlapping was small. Another rather similar test for intelligence, which was tried on some of these groups, gave them the same relative rank. The results of the test agreed closely with the general impression left on the minds of the experimenters by considerable association with the people tested. And, finally, the relative size of the cranium, as indicated, roughly, by the product of its three external dimensions, agreed closely in these groups with their appearance of intelligence, and with their standing in the form test. If the results could be taken at their face value, they would indicate differences of intelligence between races, giving such groups as the Pygmy and Negrito a low station as compared with most of mankind. The fairness of the test is not, however, beyond question; it may have been of a more unfamiliar sort of these wild hunting folk than to more settled groups. This crumb is, at any rate, about all the testing psychologist has yet to offer on the question of racial differences in intelligence.

22. HABITAT AND FOOD PLANTS OF THE COAHUILLA INDIANS¹

By DAVID PRESCOTT BARROWS

THE HABITAT OF THE COAHUILLAS

The eastern half of southern California is everywhere a desert, separated from the coast by the lofty elevations of the Sierras and the Coast Range. Northward in Inyo county is the sterile and dangerous depression famous as Death Valley. Southward, stretching from the Colorado to the Sierras, is the Mojave, the most elevated and least barren of these plains. Although its appearance is desolate, owing to the volcanic character of its rocks and its drifting beds of sand, the southern portion, now traversed by the Santa Fe Railway route, bears a valuable growth of bushes, contains many water holes, and has always proved a safe and direct route of travel. It was crossed by the old Mormon road from Salt Lake City at San Bernadino, as well as the overland trail from Santa Fe, both roads meeting near the western side of the desert on the Mojave river. The San Bernadino range and a low spur running southeastward to the Colorado river, where it is known as the Chocolate mountains, separate the Mojave from the Colorado desert. This great depressed area occupies almost the whole southern part of the state and the northeastern part of Lower California, clear to the Gulf. The northwestern portion, enclosed by the San Bernadino range and the San Jacinto mountains, is the Coahuilla or Cabeson valley, the present home of the desert Coahuilla Indians. This valley is reached from the coast by the San Gorgonio pass. From Colton eastward, there is a long and continuous ascent for thirty miles, or nearly to Banning, where the divide is reached. From this point there is a descent through the pass into the Cabeson valley. Immediately from here onward one recognizes that the country and life have changed. Dry, gravelly stretches take the place of the red, alluvial soil on the other side of the summit. Stunted creosote bushes dot the plain, but there is an absence of trees and less hardy kinds of vegetation. Where the pass widens out into the valley the road crosses the White Water river. This considerable and refreshing stream, flowing from the snow peak of Mount San Gorgonio on the north side of the pass, pours itself across the rocky cañon, and then turning east onto the sands disappears before it has gone a mile. The descent is still very rapid. Vast

¹From pages 25-31 and 54-70 of David Prescott Barrows, *The Ethno-Botany of the Coahuilla Indians of Southern California*, University of Chicago Press, 1900. The name Coahuilla, now more generally written Cahuilla, is pronounced "Kah-wee-yah."

deposits of wind-drifted sand impede one's progress and desolate the upper end of the valley. Gradually, however, these disappear, and the soil becomes a fine dark silt, the alluvial floor of an ancient fresh-water lake of wide extent, over which are dotted "montes" or clumps of mesquite, amidst which the Coahuillas have for generations dug their wells and built their homes.

Underneath the soft deposits of soil that cover the Cabeson valley there is a constant seepage of the waters that, falling upon the desert faces of the mountains, sink into the hot sand of the desert as soon as they emerge from the cañons and gorges of the hills. The depth of this subsurface flow varies in different parts of the valley, being greatest at the upper end. Indian Wells, west of Indio, is twenty-five to thirty feet deep, but in the lower parts of the Cabeson, toward the Salton Sink, water is reached at from twelve to sixteen feet below the level of the sand. In his most delightful work, the *Discovery of America*, Mr. John Fiske, in reviewing the culture of the southwest tribes of the United States, speaks of their irrigating as "mainly an affair of sluices, not of pump or well, which seem to have been alike beyond the ken of aboriginal Americans of whatever grade." The statement is in part disproved by the Coahuillas. For generations they have been well-diggers. Their very occupation of this desert was dependent on their discovery of this art. The whole valley of the Cabeson is dotted with wells, most of them marking sites of homes long ago abandoned, the wells themselves being now only wide pits partly filled with sand, but many dug in the old way still remain, supporting life and giving refreshment miles and miles away from the rocky walls where the streams of the mountains disappear in the sands. These wells are usually great pits with terraced sides leading down to the narrow hole at the bottom where the water sparkles, built in such a way that a woman with an olla on her head can walk to the very water's edge and dip her painted vessel full. The deeper it is down to the water, the larger, of course, is the excavation and the greater the diameter across its upper terrace. The Coahuillas call these wells *téma-ká-wo-mal-em*, a pretty figure. *Ká-wo-mal* is the word for a tinaja or water olla, and *témal* is the word for the earth or the ground. There is no question but that the Coahuillas learned of themselves to dig these wells, and this practice cannot perhaps be paralleled elsewhere among American Indians.

The low San Bernadinos to the north of the Cabeson valley are called by the Coahuillas *Ká-wish-Po-po-kú-ut*, or the "mountains of mesquite and tules," a name which their desolate, sandy appearance belies. The splendid San Jacinto range on the south is called the *Káwish-wa-wat-ácha*, or the "lofty mountains." Across the San Bernadino hills is the way to the Chemehuevi country, and behind these peaks these Indians annually make their camps when they come to this region to hunt mountain sheep. Up the San Jacinto ridges, dark and gloomy with shadows, run the ancient trails by which the Coahuillas entered the mountains and became hillsmen, as well as men of the desert. These trails—or "pit-em," as the Indians call them—are almost unmarked paths. They ordinarily climb out of the desert across some

great alluvial fan of cañon detritus and then follow up some deep gorge until the roughness of its torrent-swept bottom compels one to pull his scrambling pony up onto the great black ridges, that look like the giant vertabræ of fossil monsters. Water is terribly scarce in these mountains, and most of these trails converge at a little valley north of a peak of the range, Torres mountain. This valley is known to hunters as "Piñon Flats," from its forest of juniper, and here water can always be found. Long ago there was a small village here, and the site is still known to the Indians by its old name, *Kwá-le-ki*. High up on the northern side of Torres was another called *Pá-nach-sa*. These villages seem to have been halfway camps between the desert and the mountain rancherias farther on, and probably never more than a few families occupied them at a time. The elevation is five or six thousand feet higher than the desert, and the air bracing and fine. And from these eyries one can gain a wide view of the Coahuillas' home.

These mountains, arid as they are, and scantily supplied with vegetation as they *seem* to be, are nevertheless rich in botanical species, and the region is one of wondrous interest to the collector and of great value to the Indian, for it is from here that there come many of his most valued plant products. . . .

Such in general are the characteristics of life everywhere on the southern parts of the American desert. The Colorado desert, the particular home at present of the Coahuilla Indians, has, however, bizarre features peculiarly its own.

This arm of the desert was in very recent geologic time an arm of the Gulf of California. More than 1,600 square miles is still below the level of the sea, the most depressed portion being 275 feet lower than the ocean.

The Colorado river in its course south to the ocean built up a flood plain on a higher level that finally shut off the western part from a direct communication with the sea, and evaporation, with a gradual uplifting of the whole section, finally laid it bare, although leaving a great part of it below the present sea level.

The waters of the Colorado, 275 feet above sea level at Yuma, break through their banks at the summer season of high water and flow southwestward and then northward and inland forming a widely inundated area with many sloughs, the best known being the New river. This formerly took place in sufficient volume to form in the center of the valley a huge inland lake, a vestige of which still remains in the Saline lagoon at Salton.

There are three principal soil levels noticed in crossing the desert: an upper, made of great "alluvial fans," which skirt the western mountain ranges and are formed of great masses of rock, gravel, and detritus, washed by cloudbursts from the hillsides and swept far out over the sands; mingled with this layer are bits of silicified wood and oyster shells; second, a sandy middle layer, representing the former bed of the sea; and, third, a lower layer of clay or fine silt, laid down in still water and extending for many miles, representing the bed of the former fresh-water lake and subsequent lagoons, that are even now

occasionally filled by water from the New river overflows. Over the surface of this latter level are scattered great quantities of fresh-water shells, mostly small univalves *Amnicola protea* and *A. longinqua* and the *Physa humerosa*, and a single bivalve, a species of *Anodon* now found in the Colorado river (*A. Californiensis* Lea). The physa is also sometimes found, still inhabiting springs on the New river. . . .

The atmospheric conditions are fully in keeping with the other features of the desert. A temperature in summer during the daytime of 115°-120° is not uncommon in the coolest and shadiest spot obtainable. Owing to the exceeding dryness of the air, however, moisture from the body evaporates very rapidly, and even this extreme heat is not very hard to endure. A large supply of water is, however, for the white man an essential. Through the whole course of the desert, from Yuma to San Gorgonio there rages much of the time a furious storm of wind and sand. Its effects are most curious. The mountains on the northern side of the pass are piled almost to their summits with drifted sand. Enormous dunes collect at this side of the valley and vast stretches of the desert are left as smooth and clean of vegetation as a plowed and harrowed field. The wagons of parties crossing the desert along this one hundred and fifty mile sand-swept line are buried to their boxes every night by the drifted sand piles. The effects of this silica-laden wind are as terrific as a sand-blast. Telegraph poles are rapidly worn away and have to be frequently renewed. The windows of the section houses or pieces of broken bottles left on the sand are soon converted into ground glass.

Rain seldom falls on this desert in a natural manner. When it comes it is in terrific water-spouts or cloud-bursts that flood the country briefly like a lake and cut great gullies, twenty-five feet deep, in the sand. For miles the railroad track is little but a succession of culverts bridging these steep barrancas. . . .

THE FOOD PLANTS OF THE COAHUILLA INDIANS

As already suggested, to the unsophisticated it would seem that the dry and rocky slopes of the desert's sides, with their curious and repellant plant forms, could yield nothing possible for food, but in reality the severe competition and struggle with aridity have operated to invest desert plants with remarkable nutritive elements. The very hoarding of strength and moisture that goes on in many plants is a promise of hidden nutrition. And, while many plants protect their growth against destruction by animals through the secretion of poisonous or noxious elements, the cunning of the savage woman has taught her how to remove these. Beside every Coahuilla home there stands ever ready the wide *pá-cha-ka-vel*, or leaching basket. The results prove far more than the expectation would warrant.

I cannot pretend to have exhausted the food supply of these Indians, but I have discovered not less than sixty distinct products for nutrition, and at

least twenty-eight more utilized for narcotics, stimulants, or medicines, all derived from desert or semi-desert localities, in use among these Indians. To my regret I cannot in all cases announce the botanical name of the plant from which these are derived. A number of these plants, which were seen by me but once, were pointed out and the Indian name and uses described, on a trip through the desert to the Cabeson valley, with a single Indian, Celestin Torte, of Torres mountain, in the summer of 1897. Some, by their very nature, could not be carried along in the saddle, as we were; a few others, gathered and preserved, could not be identified, owing to damaged condition and absence of flower or fruit. This indeterminateness particularly applies to the numerous species of the cactus family, which grow forest-like over many of the rocky cañon sides of the descent to the desert.

The staples of the Coahuillas are fortunately all determined, some of them having a very wide use among the Indian tribes of the Southwest. It is with a description of some of these staples that we will begin.

On the desert the main reliance of the Coahuilla Indians is the algaroba or mesquite. This remarkable tree is well known to anyone who has traversed the sandy Southwest. Its range is wide, from the desert slopes of the California mountains, eastward in southern latitudes to Texas. Of the Colorado basin it is the characteristic tree. It grows to a height of from thirty to forty feet. Its wood is close-grained and hard; its leaves small but abundant, and its branches well armored with spines. On the Colorado river and its affluents and overflow streams, the New and Hardy rivers, it grows abundantly along every slough and about each lagoon. Looking down upon the Colorado desert from the heights below Jacumba bass, the desert appears banded with long stripes of splendid green. In the Cabeson valley, far above the level of the overflow, these trees grow in clumps or *montes*, striking their roots down through the sand to the subirrigation below. Frequently the wind has lodged the sand among these *montes*, until dunes fifteen to twenty feet high have been built up, covering acres in extent and burying all but the upper limbs of the trees—a curious phenomenon.

The fruit of the algaroba or honey mesquite (*Prosopis juliflora*) is a beautiful legumen, four to seven inches long, which hangs in splendid clusters. A good crop will bend each branch almost to the ground, and as the fruit falls, pile the ground beneath the tree with a thick carpet of straw-colored pods. These are pulpy, sweet, and nutritious, affording food to stock as well as to man.

Everywhere in the Colorado country, to the Mojave, Yuma, and Cocopah, as well as to the Coahuilla, they are the staple of life. The Coahuillas gather them in July and August in great quantities, drying them thoroughly and then packing them away in the basket granaries. The beans are never husked, but pod and all are pounded up into an imperfect meal in the wooden mortar. This meal is then placed in earthen dishes and thoroughly soaked. It is then ready to be eaten, and is called by the Coahuillas, *pé-chi-ta*, or *mén-yi-kish*,

according as it is, or is not, sifted. A light fermentation, which shortly results, improves it. The mass itself, while requiring vigorous mastication, is sweet and wholesome. It is sometimes rolled into compact balls and carried for food on a journey.

According to Mr. Havard, this pulp contains "more than half its weight of assimilative principles, of which the most important is sugar, in the proportion of 25 to 30 per cent."

The "screwbean" or tornillo (*Prosopis pubescens*, Benth.) is less abundant than the algaroba. Its fruit is a cluster of little yellow spirals united at one point. It contains even more saccharine matter than the algaroba, and may be eaten with relish as plucked from the tree. A fermented beverage can be made from this meal and was once much drunk by the Indians of the Colorado river. Major Heinzeleman described its use among the Yumas: "The pod mesquite begins to ripen in June, the screwbean a little later. Both contain a great deal of saccharine matter; the latter is so full it furnishes by boiling a palatable molasses, and from the former, by boiling and fermentation, a tolerably good drink may be made."

Along the overflowed banks of the New river, and elsewhere about the desert's edge, where cloudbursts or freshets send their sudden streams of muddy water out over the sand, there grows up luxuriantly an enormous species of *Chenopodium*. In the New river country I have seen the growth higher than a man's head as he sat on horseback. The stalks are sometimes six inches in diameter. The leaves are eaten readily by horses, and the plant is of much value to parties crossing the desert and to stockmen. Its local name is "careless weed." The seeds are eaten by the Indians and the leaves used for greens. Northward, in the Cabeson and Coyote, a smaller and probably distinct species, identified by Mr. Jepson as *Chenopodium Fremontii*, flourishes after freshets. Its dry branches are covered with seeds which are gathered by the Indians in large quantities, and ground into flour which is baked into little cakes. The Coahuillas call the plant *kit* or *ke-et*. After a good harvest of this *Chenopodium* the edge of the Coyote cañon will be fringed with granaries holding stores of this food.

Another queer little plant that starts up after storm irrigation is the *Salicornia subterminalia*. Its structure is pulpy and almost leafless. I once found it growing abundantly about Indian Wells. The Coahuillas call this plant *hó-at*, and formerly used its seeds for food. These seeds were crushed finely into meal on a metate.

The most varied stores of food, however, do not come from the fluvial plain of the Colorado, but from the forbidding mountains that rise high and abruptly on the westward. The character of these ranges has already been partially noted. Their sides are very steep. There are no ranges of foothills or graduated ascents. From the level of the sea at Palm Springs, San Jacinto rises almost sheer upward to a height of 11,000 feet. Only by certain cañons can these mountains be ascended, even by foot climbers. The Ta-quitch

cañon that enters Palm Valley is said to be insurmountable. Partly because of this precipitancy and partly because grass and protective foliage are wholly absent, there is little opportunity for soil formation on the desert side. The fragments of rock and soil are swept away and deposited in the great alluvial fans that clog for miles the foot of the cañons.

Nevertheless, the mountains support a bewildering variety of plant life. Nowhere could the relationship of plants to their surroundings be more copiously illustrated. While numbers are few and growth is sparse, the species are very numerous. Most of these plants grow in clumps or communities, and afford illustration of the coöperation and mutual support compelled by the desert. From the lower levels of the cañons, by which one begins an ascent, to the summits, where the character of living things suddenly changes, plants and shrubs are met everywhere, growing amid the broken rocks. Curious cacti cover a hillside with an armament of spines, and small annuals dot the sandy levels along the bottoms of the gorges. So it is to these arid but fruitful slopes that the women of the desert plain and the mountain valley both go for food.

Most remarkable of all the plants that flourish in these wastes is the agave, perhaps the most unique and interesting plant of all America. It ranges widely throughout southwestern United States and Mexico with a large number of species, perhaps one hundred in all; and outside of Mexico, where it furnishes "pulque" and "vino mescale," it is used for food by Apaches, the Pah Ute family, and desert tribes in general. By all these Indians it is prepared for food in much the same way. Several species have become familiar, as the "century plants" of California gardens, but they are not handsome plants except when in bloom, though they give themselves most beautifully to the wants of the Indian.

The life history of all these species is much the same. They come up in little round heads or cabbages. For years this head enlarges, throwing out fibrous leaves armed with a spine at the point. Even in the hot air of the desert it is twelve to fifteen years before the period of flowering is reached. Then from the center of the plant there starts up a stalk, growing with great rapidity. In the larger species this stalk may be twenty to thirty feet high and eighteen inches through at the base. From this stalk clusters of pale yellow blossoms, thousands in number, open in the hot, quivering sunshine. This supreme act ends the life of the plant.

Within the territory of the Coahuillas there is but a single species, the *Agave deserti*, Engelm., which grows abundantly along the eastern base of the coast ranges in San Diego county, and southward into Baja California. It was first discovered by Lieutenant W. H. Emory, of the Mexican Boundary Survey, in 1846. It is a small species with leaves densely clustered, thick and deeply concave, only six to twelve inches long. The scape or stalk is from ten to twelve feet high and slender. The flowers are a bright yellow. From April on, the cabbages and stalks are full of sap and are then roasted. Parties

go down from the mountain villages into Coyote cañon for the purpose. Great fire pits or ovens, called *na-chish-em*, are dug in the sands and lined with stones. Fire is kept up in the pit until the stones are thoroughly heated; the mescal heads are then placed in the hole and covered over with grass and earth and left to roast for a day or two. Mescal heads thus cooked consist of fibrous, molasses-colored layers, sweet and delicious to the taste and wonderfully nutritious. Pieces will keep for many years. The agave is called *a-mul*, the sections of the stalk, *u-a-sil*, which are also roasted and, though fibrous, are sweet and good, and the short leaves about the head, *ya-mil*. The yellow blossoms, *amu-sal-em*, are boiled and dried for preservation, and then boiled anew when ready to be eaten. The fibers from the leaves of the agave, *amu-pa-la*, are exceedingly important in manufactures and their uses have been noticed above.

The *Yucca Mohavensis* (Coahuilla *hú-nu-vút*) grows abundantly on various hillsides and sandy cañons of the southern exposure of the San Jacinto range, as well as near the summits of the cañons on the desert slopes. The species is quite different in appearance from the *Yucca Whipplei*, Torr., which grows so abundantly nearer the coast and in the vicinity of Pasadena, and is known as the "Spanish bayonet" or *quijotes*. In the *Yucca Mohavensis* the clusters of spines are very dense about its foot, and its short, thick stump or caudex rises to a height sometimes of six feet from the ground. Its flower stalk or scape is short and thick, but clustered with the delicate waxy flowers of the yucca kind. The fruit, *nin-yil*, appears as plump, sticky, green pods, three or five inches long with big, black seeds filling the center in four rows. These are picked when green and roasted among the coals. They have a sweet, not unpleasant taste, slightly suggestive of roasted green apples. When ripe, the pods are eaten uncooked and are sweet and pleasant, though slightly puckering to the taste.

The *Yucca Whipplei* grows but sparsely in the territory ranged by the Coahuillas. Its stalk, called *pa-nu-ul*, is cut before flowering when full of sap, and roasted in sections in a fire pit for one night. The dates or seed bags, *wa-wal*, are also eaten, as well as the flowers, which when in bloom are picked and cooked in water in an olla. Growing with a clump of agave and yuccas, on the north slope of Torres mountain, I had once pointed out to me a different variety of yucca, probably an unnamed species, which the Coahuillas call *ku-ku-ul*. It is small with slender spines. The head and stalk are roasted and eaten.

The variety of trees and shrubs of peculiarly desert characteristics, which grow over the desert side of the mountains from bases to summits and whose products are made by the Indian to yield food, follow next in our description.

The "ochotilla," or *Fouquieria spinosa* or *splendens*, has already been described. It is a splendid example of desert modification, but its anomalies make it difficult of classification. It grows in clumps on the rocky ridge slopes near the base of the San Jacinto mountains. The Coahuillas, who call

it *o-tos*, eat its splendid crimson blossoms, which cluster at the extreme end of its long, drooping branches, as well as its small fruit, which consists of oblong capsules filled with minute seeds. These branches, loaded as they are with thorns, are ingeniously used by the Cocopah Indians far south in the Colorado desert of Baja California in making fences. Two or three of these branches tied above one another between posts make a barrier through which the most persistent burro will not pass. In this way the Indians inclose many acres of soil, annually inundated by the overflow of Hardy's Colorado river, and subsequently planted to maize, beans, and melons.

In the cañon bottoms as they open out into the desert, grows quite abundantly the "palo verde" (*Parkinsonia Torreyana*), which the Coahuillas call *o-o-wit*. Its bright green bark and abundant, though deciduous foliage, make it a handsome tree in the midst of its surroundings. Its fruit is a slender bean, two or three inches long, which the Coahuillas grind and cook into an atole.

The *Zizyphus Parryi*, Torr., is a very spiny and intricately-branched shrub, from five to fifteen feet high. It grows about the springs in the higher parts of the cañons, and bears a small yellowish red berry or fruit, which is dry and almost hard. The Coahuillas call this plant *o-ot* and use the fruit by pounding it into meal for atole.

Besides the legumens already described there is a third, whose pod furnishes food, though in somewhat sparse quantities. This is the *Acacia Greggii*, Gray. In the San Felipe valley, below Warner's Ranch, there is a great deal of it, and a considerable harvest of pods can be gathered by the Indians of the valley. But it does not grow abundantly in the territory of the Coahuillas and is only occasionally used. It is called *si-ching-al*.

Higher up on the mountains grow two species of wild plum or cherry. One, the *Prunus ilicifolia*, Walp., has an extensive range along the California coast and had a wide use among the California Indians. It is called by the Mexicans "yslay" and by the Coahuillas *chá-mish*. It grows abundantly in all the cañons of the San Jacinto mountains, its dark, handsome foliage crowding many a pass and hillside. Its fruit is of a reddish-yellow color, and resembles very small gage plums. The pulp is, however, very thin and puckery and the pit preposterously large. It is the kernel of the latter and not the pulp that is mostly utilized. These plums are gathered in very large quantities in August and are spread in the sun until the pulp is thoroughly shrunk and dried. The thin shells of the pits are then easily broken open and the kernels extracted. These are crushed in the mortar, leached in the sand basket, and boiled into the usual atole. The other plum tree has with some question been identified by Mr. Jepson as the *Prunus Andersonii*, Gray. I found it growing along the eastern summits of the San Jacinto range. Its fruit somewhat resembles the *Zizyphus* and was formerly eaten by the Coahuillas, who called it *cha-wa-kal*.

The *Prunus demissa*, a shrub with a wide green leaf, grows about the springs and moist cañons of Coahuilla valley. Its fruit is a small red berry called *a-tut*.

A small grayish-green shrub, doubtfully identified by Mr. Jepson as *Halodiscus discolor*, Maxim, is called by the Coahuillas *tét-nut*. I have never seen the fruit, but the Indians say that though small it is good food.

Before dismissing the truly desert plants that yield food, a word is merited by the palms. These have been referred to above. They grow in long, waving lines along the gorges leading into the desert wherever water stands in pools or seeps through the sandy bottoms. Beneath the wide fronds the dates grow in great clusters, supported by a strong but drooping stalk. These dates are very small and the seeds are disproportionately large, but early in the fall, when they ripen, the Coahuillas lasso the clusters and draw them down for food. Swarms of bees surround the fruit as it ripens, and in the fronds of the palms are multitudes of "yellow jacket's" nests. The Indians of Lower California cut out the heart or center of the top of young palms and eat them with great relish. I have not known the Coahuillas to indulge in these "palmitos."

In the valleys near the summit of the range and especially in the Piñon Flats are groves of the *Juniperus occidentalis*, Hook., low evergreen trees, with thin, shreddy bark. The fruit, a bluish-black drupe the size of a small marble, is eaten by the Coahuillas and called by them *is-wut*.

The acorn was one of the most generally used foods of the Indians of the Pacific coast. Its use was noticed by Cabrillo, the first white explorer to navigate these waters. "They eat acorns and a grain which is as large as maize and is white, of which they make dumplings. It is good food." Certain parts of the coast, the Upper San Joaquin valley and the mountains of the Coast Range are thickly covered with forests of this stately tree. There are no less than fourteen species of oaks in the whole of California and about eight are found in the southern part of the state. Their fruit contains "starch, fixed oil, citric acid, and sugar, as well as astringent and bitter principles." The largest and most palatable acorn is that of the white oak, or Mexican "roble" (*Quercus lobata*), "common throughout the state, on the plains and in the foot-hills, in the southern part of the state somewhat higher in the mountains." It was mostly from this tree that the Indians of the past supplied themselves.

All the "live oaks" also, among them the *Quercus Englemanni*, yield palatable acorns. There are several desert and shrub species, *Q. undulata*, Torr., *Q. oblongifolia*, and *Q. Wislizeni*, var. *frutescens*, the "desert oak" of the Southwest, from three to ten feet high. *Q. agrifolia*, Née, is the only one of the black oaks affording food to the Indians. It is the coast live-oak of California, the "encino" of the Mexicans. The oak is, however, somewhat rare within the habitat of the Coahuillas and the acorn is not to them of great economic importance. They do not put the same dependence upon it as did the Indians along the coast.

The *Quercus dumosa*, Nutt., which has a thick, large fruit, grows on the Coahuilla mountain and is gathered in considerable quantities by the Indians

of Coahuilla valley.² This acorn is called by them *kwín-yil*. It is ground in the mortar and leached in the sand basket. Dr. Havard reports that the sand mixed with the meal by washing has "a decided effect upon the teeth. My informant, a medical officer, tells me that he has seen an Indian forty-five years old with the crowns of his otherwise healthy teeth half gone, while in Indians sixty years old it is not uncommon to see all the teeth worn down even with the gums." Although the sand basket as a means for preparing food is in constant use among the Coahuilla Indians, I have never myself noticed any such effects.

The piñon or pine nut is a very important article of food. The lower limit of the pineries, in southern California, is, of course, high, being almost everywhere about 5,000 feet, and it is only by reason of the fact that the Coahuillas have penetrated into the mountains from the desert that this source of food is available to them at all. The summits of Torres and Coahuilla mountains and the higher San Jacinto peaks are covered with pines of several species; the gigantic sugar pine of the Pacific slope (*P. Lambertiana*, Dougl.) with a cone a foot and half in length, the Mexican nut pine (*P. Sembroides*), and (*P. Parryana*, Eng.), and also the single-leafed or Nevada nut pine (*P. Monophylla*), so precious to the Indians of the Great Basin. These nuts are gathered in large quantities, generally in the late fall of the year. Mr. B. H. Dutcher, of the Death Valley Expedition of 1891 has given a careful account of piñon gathering among the Panamints on the west side of Death Valley. The tree was the *P. monophylla*, which has a small cone three inches long. These were pulled and beaten from the trees with a pronged stick and collected in light packing baskets while still sticky with gum. They were then piled on a heap of brush and roasted, which dried the pitch and spread the leaves of the cone. The nuts were then jarred out by a heavy blow from a stone on the apex of the cone. The nuts were winnowed from the chaff by tossing them from a flat basket in the breeze. The Coahuillas harvest the nuts in precisely the same manner. Sometimes in mid-summer the cones are beaten from the trees, before the ripened harvest time, thoroughly roasted in a fire, split open with a hatchet and the nuts extracted. Piñones are called by the Coahuillas *te-wat-em*; the cones *te-vat*, and the little almond-like cavities in which the nuts lie and which are exposed in section when the cone is split open are called *he-push* or the "eyes" of the *te-vat*. The pine most used is the *Pinus monophylla*.

The sambucus or elder is of well-known value to the Indians of North America and many are the purposes it serves. The Spaniards in this state fully appreciated it and gave it the name by which it is still well known, "sauco." The *Sambucus Mexicana*, Presl., is highly prized by the Coahuillas. By them it is called *hun-kwat*. Throughout the months of July and August the berries are gathered in large quantities. The little clusters are usually

²In the mountains, west of the desert in which the majority of the Cahuillas live.—*Ed.*

dried carefully on the drying floor and so preserved in considerable amounts. When wanted they are cooked into a rich sauce that needs no sweetening. They are delicious thus prepared. An Indian family during this season of the year will subsist largely on these messes of "saucó."

Several species of the manzanita, an exceedingly handsome tree or shrub with a rich red-colored bark and small ever-green leaves, grow on these mountains. It has a red fruit and is very common. The "great-berried manzanita" (*Arcostaphylos glauca*) is common throughout the coast. Manzanita is a Spanish word, the diminutive of "manzana," meaning "little apple." The fruit is much enjoyed by the Coahuillas and is called *ta-tu-ka*. It is eaten raw and is also dried, pounded into a flour, and mixed with water.

The sumac (*Rhus trilobata*, Nutt.), the twigs of which are so important in basket making, bears a very small red berry, *sel-it-toi*, which is very sour but much used both fresh and dried. Soaked in water it makes a refreshing drink. The use of the rhus was noticed by Dr. Edward Palmer.

Perhaps the most important of the seed foods used by the Indians is the justly famed "chia" (*Salvia Columbariae* Benth.), called by the Coahuillas *pá-sal*. The plant is one of the smallest of the sage family. It grows up from an annual root with a slender branching stem, terminated by several curious whorls containing the seeds. These are dark, round, flat bodies, that have a slippery, uncertain feeling to the touch. The genus *Salvia* has an exceedingly wide range and use as a food plant. According to Dr. Havard the *Salvia polystarchia*, Ort., is largely cultivated in northern and central Mexico. These seeds are rich in mucilage and oil. "After careful roasting they are ground into meal, which, when thrown into water, expands to several times its bulk, the mucilage rapidly dissolving. By adding lemon and sweetening a very popular Mexican beverage is produced."

Chia was a staple food with the Indians of the Pacific coast. Large quantities, already parched, have been taken from graves on the Santa Barbara channel. The seeds are gathered by the Coahuillas with the seed fan and flat basket, and are parched and ground. The meal is then mixed with about three times as much wheat flour and the whole pounded up together. It makes a dark looking meal. This is "pinole," called by the Coahuillas *to-at*. It is an old and famous preparation. Molina gives the following definition of its constituents as made in Mexico: "Pinolli la harnia de mayz y chia antes que la deslian." A little sugar is usually mixed with it. In this shape it is a much prized article of food with all who have become acquainted with its nutritive and reviving qualities. Experienced prospectors and desert travelers carry a little bag of it with them, and when the warm, alkali water holes are reached, a few teaspoonfuls of the pinole in a quart cupful of the water seems to neutralize somewhat its dangerous qualities and make a refreshing drink more nourishing than gruel.

Pinole, by the Coahuillas, is sometimes baked into little cakes or biscuits. Either way chia is used, it is very good; has a pleasant, nutty flavor, and is

exceedingly wholesome. Moreover, it grows in considerable quantity through the mountain ranges of the Coahuillas, and in the early summer ollas stored with these seeds stand in every home, and throughout the cooler hours of the day and evening there is ever a woman grinding at her mill.

Beside the salvia, several other plants yield seeds that attract the Indian woman and keep her busy through the months of May and June with her yi-kow-a-pish and chi-pat-mal. Some of these seeds are very beautiful, and possess a real fascination for the eye and touch. The seeds of the *Lasthenia glabrata* (Lindb.), called by the Coahuillas *ák-lo-kal*, in mass resemble iron filings, being of a dark color and fine elongated shape. They are prepared by being pounded up into a very fine flour, which is eaten dry.

But the most beautiful little seed of all is that of the small crucifer called "pepper grass," *Sisimbrium canescens*, Coahuilla *ás-il*, a tiny reddish-brown seed, round, and flat in shape. It is ground up, cooked in a large quantity of water, and eaten with a little salt.

The *Atriplex lentiformis*, Watson, one of the "salty sages," is found in the Coahuilla valley and on the slopes of the Sierras. Its seeds somewhat resemble the chia. They are prepared for food by grinding and cooking with salt and water. It is called *ká-sil*.

The dry flats and valleys of the Coahuilla mountains are frequently closely planted with wormwood, the *Artemisia tridentata*, Nutt. Its feathery foliage whitens the landscape, and for long distances its pungent odor dominates over every other fragrance. The seeds ripen late in the fall, and are gathered by the Coahuillas and pounded up for pinole. The plant and seed are named by the Coahuillas *wík-wut*. . . .

Among the fruits most important to the Indian inhabitants of the Southwest stand those of the cactus family. There are over fifty species in the United States and a majority of these are found in California.

The Mexican prickly pear or "tuna" (*Opuntia tuna*, Mill) is said by Dr. Havard to have been brought to the Pacific coast from Mexico, where it had been cultivated from time immemorial. It was planted in hedges about the missions and ranch-houses, where it thrives still in picturesque clusters and is now thoroughly naturalized. Its fruit is the well-known "Indian fig." While it has not been planted anywhere on the reservations of the Coahuillas, they sometimes obtain the fruit from other Indians of the valleys. The cactus plant is called by the Coahuillas *na-vit* and the little bud-like fruit *na-vit-yu-lu-ku* or "the little heads of the cactus."

There are numerous species of cactus throughout the mountains down to the desert level. About a dozen yield fruit products utilized by the Coahuillas. In most cases it is the ripened fruit or "fig" that is eaten. In several cases it is the abundant seeds, in others, the buds and succulent joints of stalk. Except in a few instances I can do no more in the way of identification of these species than to give a description of the plant and state its uses and Indian name.

The *Opuntia basilaris* is an especially valuable cactus plant of the Coahuillas. It is one of the small varieties and has a tenderslate-colored stem in flat joints. The young fruit in early summer is full of sweetness. These buds are collected in baskets, being easily broken off with a stick. The short, sparse spines are wholly brushed off with a bunch of grass or a handful of brush twigs. The buds are then cooked or steamed with hot stones in a pit for twelve hours or more. This cactus is called *má-nal*. Mr. Coville describes exactly the same use of this plant by the Panamints. This cooked cactus is, he says, called *nā-vo*. I would call attention to the similarity of this word to the general Coahuilla word for cactus fruit, *na-vit*. No vocabulary of the Panamints has ever been published, but they are undoubtedly of the same great stock as the Coahuillas and such verbal similarities are to be expected.

Mu-tal is another of the opuntia, with flat, ugly jointed stems, growing low and spreading over the ground in the most arid stretches of the valleys. The flat joints, the size of one's palm, are crowded along their edges with buds as big as the last joint of a man's thumb. They are gathered in large quantities, brushed, and dried. They are often stored for subsequent use, and when needed for food are prepared by boiling in water with a little salt and lard. Very frequently also the fruit is allowed to ripen for its seeds. The figs, after being dried, are spread out on a hard, smooth, dirt floor and then the woman sits down beside the pile of cactus heads and with a flail, made from the leaf stem of the desert palm, thoroughly threshes out the seeds. These are then winnowed from the chaff and stored for winter use. Along through the winter, as needed for food, they are pounded into meal and cooked into an atole. These seeds are called *wi-al* and they are obtained from several species of cactus besides the *mu-tal*.

There are two cacti growing along the slopes of Torres mountain that in growth and structure much resemble the *Opuntia tuna*. I have not seen them in bloom and know nothing of their flowers. Both yield luscious fruit in large quantities. *Ti-nup-em* might readily be mistaken for a neglected and stunted growth of the cultivated tuna. *Na-u-tem* is not so thrifty and grows low on the ground. Its flat stems have exceptionally long spines, two to three inches. The *a-yu-vi-vi* is a very small cactus, only about four inches high and covered with little hooked spines. It has a very small, sparse fruit.

The *cho-kal* is a very furry cactus, with round jointed stems two to three feet high. It is light brown in color and grows in communities, sometimes covering a rocky cañon side for a half mile to the exclusion of almost everything else. It throws off extremely disagreeable balls of spines which fasten in a horse's fetlocks and give instant trouble. Its fruit, which I have never seen, is said to be very good.

U-a-chim is one of the cylindrical or barrel-shaped cacti, light colored and furry. It has an edible fruit.

Ko-pash is the famed "nigger head," the *Echinocactus cylindricis*. It appears above the sand simply as a round fluted globe, a little larger than a

man's head. It is covered with spines and bears a small edible fig. But its chief value does not lie in its fruit, but in its succulent and thirst-relieving interior. No plant could be more admirably contrived as a reservoir, and the thick tough rind and protective spines enclose an interior that is full of water. This plant is often resorted to by thirsty travelers and, according to the stories told over the desert, frequently saves life.

A review of the food supply of these Indians forces in upon us some general reflections or conclusions. First, it seems certain that the diet was a much more diversified one than fell to the lot of most North American Indians. Roaming from the desert, through the mountains to the coast plains, they drew upon three quite dissimilar botanical zones. There was no single staple, on the production of which depended the chances of sufficiency or want. Any one of several much used products might be gathered in sufficient quantities to carry the entire tribe through a year of subsistence. There was really an abundant supply of wild food, far more than adequate, at nearly all times of the year, for the needs of the several thousand Indian inhabitants of former times, although hardly a score of white families will find a living here after all the Indians are gone. And the secret of this anomaly lies in the fact that the Indian drew his stores of food from hillsides and cañons, where the white man looks for nothing and can produce nothing. The territory is a very large one, perhaps 4,000 square miles of cañons and mountains, rough plains, and sandy deserts. In all of it, as we have seen, there are few spots of beauty; only the valleys of pines, the wonderful cañons of palms, and the green potreros about the springs; while over most broods the hot, throbbing silence of the desert. And yet this habitat, dreary and forbidding as it appears to most, is after all a generous one. It bears some of the most remarkable food plants of any continent. Nature did not pour out her gifts lavishly here, but the patient toiler and wise seeker she rewarded well. The main staples of diet were, indeed, furnished in most lavish abundance. Let us notice a few instances. The crops of legumens, that annually fall from the splendid mesquite groves of the Cabelson or the New river country, could not be wholly utilized by a population that numbered a hundred thousand souls. I have seen the mesquite beans fallen so heavily beneath the trees in the vicinity of Martinez as to carpet the sand for miles. Centals could be gathered about every tree. Hundreds of horses and cattle that ranged the valley, to say nothing of the busy women that had crowded their granaries full, effected no visible diminution of the supply.

In the splendid moonlight, after the heat of the day, from all directions there would come the busy thud of pestle in wooden mortar, as the women worked leisurely at the mills, while jest and laughter broke the continuity of their toil. Every bush or tree was dropping fatness. The desert seemed the very land of plenty, where the manna fell at each man's door.

Or, consider the agave. The various portions of a single plant might keep a family in food for a week. It is a splendid food, delicious, nourishing, and

when roasted seemingly superior to deterioration. The lower levels of the cañons of the San Jacinto range or the sides of the Coyote valley could annually feed an army with agave. The "chamish" or "yslay" (*Prunus Andersonii*) in certain parts of the mountains grows very abundantly and yields splendidly. A single cañon often contains enough to supply an entire village with meal of pounded pits. Within the habitat of the Coahuillas scores of such cañons could be found.

The road from Coahuilla valley down to Ahuanga creek descends along the bottom of a gorge. The sides of this cañon are covered with *Yucca Mohavensis*. In July or early August these palm-like trees, for so they almost are, are all crowded with stalks hung with heavy pods, more fruit drying in the sun than the entire tribe could devour. The groves of oaks and pines in the higher valleys of San Jacinto; the abundant crops of chia and other seed plants; the elder berry, so greatly enjoyed, that frequently families will live for weeks on little else; all of these can be found in inexhaustible quantities. Another fact very favorable to the Indians is the long season over which the gathering of these staples is distributed. The harvest time opens in April, with the budding out of agave and yucca stalks, and from this time until late fall there is no month without its especial product. The chia and other seed plants are ready for the fan in May and June, the wild plums in June and July, the mesquite and sambucus in August, and the piñons and acorns from September on. For only about four months of winter was it necessary to hoard food. The ollas and basket granaries were sufficient store-houses.

23. TERRACE AGRICULTURE IN THE PHILIPPINES¹

By A. E. JENKS

In all of Igorot culture the most apparent and strikingly noteworthy fact is its agriculture. In agriculture the Igorot has reached his highest development. On agriculture hangs his claim to the rank of barbarian—without it he would be a savage.

Igorot agriculture is unique in Luzon, and, so far as known, throughout the Archipelago, in its mountain terraces and irrigation.

There are three possible explanations of the origin of Philippine rice terraces. First, that they (and those of other islands peopled by primitive and modern Malaysians, and those of Japan and China) are indigenous—the product of the mountain lands of each isolated area; second, that most of them are due to cultural influences from one center, or possibly more than one center, to the north of Luzon—as influences from China or Japan spreading southward from island to island; third, that they, especially all those of the islands—excluding only China—are due to influences originating south of the Philippines, spreading northward from island to island.

Terracing may be indigenous to many isolated areas where it is found, and doubtless is to some; it is found more or less marked wherever irrigation is or was practised in ancient or modern agriculture. However, it is believed not to be an original production of the Philippines. Certain it is that it is not a Negrito art, nor does it belong to the Moro or to the so-called Christian people.

Different sections of China have rice terraces, and as early as the thirteenth century Chinese merchants traded with the Philippines, yet there is no record that they traded north of Manila—where terracing is alone found. Besides, the Chinese record of the early commerce with the Islands—written by Chao Jukua about 1250 it is claimed—specifically states that the natives of the Islands were the merchants, taking the goods from the shore and trading them even to other islands; the Chinese did not pass inland. Even though the Chinaman brought phases of his culture to the Islands, it would not have been agriculture, since he did not practice it here. Moreover, whatever culture he did leave would not be found in the mountains three or four days inland, while the people with whom he traded were without the art. The same argu-

¹Pages 88-93 of A. E. Jenks, "The Bontoc Igorot," *Philippine Islands Ethnological Survey Publications*, volume 1, 1905. The Bontoc Igorot live in the interior of the northern part of the Island of Luzon.

ments hold against the Japanese as the inspirers of Igorot terraces. There is no record that they traded in the islands as early as did the Chinese, and it is safe to say, no matter when they were along the coasts of Luzon, that they never penetrated several days into the mountains, among a wild, head-hunting people, for what the agricultural Igorot had to sell.

The historic cultural movements in Malaysia have been not from the north southward but from Sumatra and Java to the north and east; they have followed the migrations of the people. It is believed that the terrace-building culture of the Asiatic islands for the production of mountain rice by irrigation during the dry season has drawn its inspiration from one source, and that such terraces were found today in Java, Lombok, Luzon, Formosa, and Japan are a survival of a very early culture which spread from the nest of the primitive Malayan stock and left its marks along the way—doubtless in other islands besides these cited. If Japan, as has Formosa, had an early Malayan culture, as will probably be proved in due time, one should not be surprised to find old rice terraces in the mountains of Batanes Islands and the Loo Choo Islands which lie between Luzon and Japan.

BUILDING THE SEMENTERA

It must be noted here that all Bontoc agricultural labors, from the building of the sementera to the storing of the gathered harvest, are accompanied by religious ceremonials. They are often elaborate, and some occupy a week's time. These ceremonials are left out of this chapter to avoid detail; they appear in the later chapter on religion.

There are two varieties of sementeras—garden patches, called "pay-yo'"—in the Bontoc area, the irrigated and the unirrigated. The irrigated sementeras grow two crops annually, one of rice by irrigation during the dry season and the other of camotes, "sweet potatoes," grown in the rainy season without irrigation. The unirrigated sementera is of two kinds. One is the mountain or side hill plat of earth, in which camotes, millet, beans, maize, etc., are planted, and the other is the horizontal plat (probably once an irrigated sementera), usually built with low terraces, sometimes lying in the pueblo among the houses, from which shoots are taken for transplanting in the distant sementeras and where camotes are grown for the pigs. Sometimes they are along old water courses which no longer flow during the dry season; such are often employed for rice during the rainy season.

The unirrigated mountain-side sementera, called "fo-ag'," is built by simply clearing the trees and brush from a mountain plat. No effort is made to level it and no dike walls are built. Now and then one is hemmed in by a low boundary wall.

The irrigated sementeras are built with much care and labor. The earth is first cleared; the soil is carefully removed and placed in a pile; the rocks are dug out; the ground shaped, being excavated and filled until a level results.

This task for a man whose only tools are sticks is no slight one. A huge boulder in the ground means hours—often days—of patient, animal-like digging and prying with hands and sticks before it is finally dislodged. When the ground is leveled the soil is put back over the plat, and very often is supplemented with other rich soil. These irrigated sementeras are built along water courses or in such places as can be reached by turning running water to them. Inasmuch as the water must flow from one to another, there are practically no two sementeras on the same level which are irrigated from the same water course. The result is that every plat is upheld on its lower side, and usually on one or both ends, by a terrace wall. Much of the mountain land is well supplied with boulders and there is an endless water-worn supply in the beds of all streams. All terrace walls are built of these undressed stones piled together without cement or earth. These walls are called “fa-nīng’.” These are from 1 to 20 and 30 feet high and from a foot to 18 inches wide at the top. The upper surface of the top layer of stones is quite flat and becomes the path among the sementeras. The toiler ascends and descends among the terraces on stone steps made by single rocks projecting from the outside of the wall at regular intervals and at an angle easy of ascent and descent.

These stone walls are usually weeded perfectly clean at least once each year, generally at the time the sementera is prepared for transplanting. This work falls to the women, who commonly perform it entirely nude. At times a scanty front and back apron of leaves is worn tucked under the girdle.

In the Banawi [Ifugao] district, south of the Bontoc area, there are terrace walls certainly 75 feet in height, though many of these are not stones, since the earth is of such a nature that it does not readily crumble.

It is safe to say that nine-tenths of the available water supply of the dry season in the Bontoc area is utilized for irrigation. In some areas, as about Bontoc pueblo, there is practically not a gallon of unused water where there is space for a sementera.

A single area consisting of several thousand acres of mountain side is frequently devoted to sementeras, and I have yet to behold a more beautiful view of cultivated land than such an area of Igorot rice terraces. Winding in and out, following every projection, dipping into every pocket of the mountain, the walls ramble along like running things alive. Like giant stairways the terraces lead up and down the mountain side, and, whether the levels are empty, dirt-colored areas, fresh, green-carpeted stairs, or patches of ripening, yellow grain, the beholder is struck with the beauty of the artificial landscape and marvels at the industry of an otherwise savage people.

IRRIGATING

By irrigation is meant the purposeful distribution of water over soil by man by means of diverting streams or by the use of canals in the shape of ditches or troughs for conveying and directing part of a water supply, or by means of some other man-directed power to raise water to the required level.

The Igorot employ three methods of irrigation: One, the simplest and most natural, is to build sementeras along a small stream which is turned into the upper sementera and passes from one to another, falling from terrace to terrace until all water is absorbed, evaporated, or all available or desired land is irrigated. Usually such streams are diverted from their courses, and they are often carried long distances out of their natural way. The second method is to divert a part of a river by means of a stone dam. The third method is still more artificial than the preceding—the water is lifted by direct human power from below the sementera and poured to run over the surface.

The first method is the most common, since the mountains in Igorot land are full of small, usually perpetual, streams. There are practically no streams within reach of suitable pueblo sites which are not exhausted by the Igorot agriculturist. Everywhere small streams are carefully guarded and turned wherever there is a square yard of earth that may be made into a rice sementera. Small streams in some cases have been wound for miles around the sides of a mountain, passing deep gullies and rivers in wooden troughs or tubes.

Much land along the river valleys is irrigated by means of dams, called by the Igorot "lung-ud'." During the season of 1903 there was one dam across the entire river at Bontoc, throwing all the water which did not leak through the stones into a large canal on the Bontoc side of the valley. Half a mile above this was another dam diverting one-half the stream to the same valley, only onto higher ground. Immediately below the main dam were two low piles of stones jutting into the shallow stream from the Bontoc side, and each gathering sufficient water for a few sementeras. Within a quarter of a mile below the main dam were three other loose, open weirs of rocks, two of which began on a shallow island, throwing water to the Samoki side of the river. In the stream a short distance farther down a shallow row of rocks and gravel turned water into three new sementeras constructed early in the year on a gravel island in the river.

The main dam is about 12 feet high, 2 feet broad at the top, 8 or 10 at the bottom, and is about 300 feet long. It is built each year during November and December, and requires the labor of fifteen or twenty men about six weeks. It is constructed of river-worn boulders piled together without adhesive. The top stones are flat on the upper surface, and the dam is a pathway across the river for the people from the time of its completion until its destruction by the freshets of June or July.

The upper dam is a new piece of primitive engineering. It, with its canal, has been in mind for at least two years; but it was completed only in 1903. The dam is small, extending only half way across the river, and beginning on an island. This dam turns water into a canal averaging three feet wide and carrying about five inches of water. The canal, called "a'-lak," is about 3000 feet long from the dam to the place of discharge into the level area. For about 530 feet of this distance it was impossible for the primitive engineer to construct a canal in the earth, as the solid rock of the mountain dips vertically

into the river. About fifty sections of large pine trees were brought and hauled into troughs, called "ta-la'-kan," which have been secured above the water by means of buttresses, by wooden scaffolding, called "to-kod'," and by attachment to the overhanging rocks, until there is now a continuous artificial waterway from the dam to the tract of irrigated land.

Considerable engineering sense has been shown and no small amount of labor expended in the construction of this last irrigating scheme. The pine logs are a foot or more in diameter, and have a waterway dug in them about ten or twelve inches deep and wide. These trees were felled and the troughs dug with the wasay, a short-handled tool with an iron blade only an inch or an inch and a half wide, and convertible alike into ax and adz.

There seems to be a fall of about twenty-two feet between the upper dam and the discharge from the troughs. This fall in a distance of about 3000 feet seems needlessly great; however, the primitive engineer has shown excellent judgment in the matter. First, by putting the dam (upper dam) where it is, only half the stream had to be built across. Second, there is a rapids immediately below the dam, and, had the Igorot built his dam below the rapids, a dam of the same height would have raised the water to a much lower level; this would have necessitated a canal probably ten or twelve feet deep instead of three. Third, the height of the water at the upper dam has enabled him to lay the log section of the waterway above the high-water mark of the river, thus probably insuring more or less permanence. Had the dam been built much lower down the stream the troughs would have been near the surface of the river and been torn away annually by the freshets, or the people would be obliged each year to tear down and reconstruct that part of the canal. As it now is it is probable that only the short dam will need to be rebuilt each year.

All dams and irrigating canals are built directly by or at the expense of the persons benefited by the water. Water is never rented to persons with sementeras along an artificial waterway. If a person refuses to bear his share of the labor of construction and maintenance his sementeras must lie idle for lack of water.

All sementera owners along a waterway, whether it is natural or artificial, meet and agree in regard to the division of the water. If there is an abundance, all open and close their sluice gates when they please. When there is not sufficient water for this, a division is made—usually each person takes all the water during a certain period of time. This scheme is supposed to be the best, since the flow should be sufficient fully to flood the entire plat—a 100-gallon flow in two hours is considered much better than an equal flow in two days.

During the irrigating season, if there is lack of water, it becomes necessary for each sementera owner to guard his water rights against other persons on the same creek or canal. If a man sleeps in his house during the period in which his sementeras are supposed to receive water, it is pretty certain that his

supply will be stolen, and, since he was not on guard, he has no redress. But should sleep chance to overtake him in his tiresome watch at the sementeras, and should some one turn off and steal his water, the thief will get clubbed if caught, and will forfeit his own share of water when his next period arrives.

The third method of irrigation—lifting the water by direct human power—is not much employed by the Igorot. In the vicinity of Bontoc pueblo there are a few sementeras which were never in a position to be irrigated by running water. They are called “pay-yo’ a kao-u’-chan,” and, when planted with rice in the dry season, need to be constantly tended by toilers who bring water to them in pots from the river, creek, or canals. On the Samoki side of the valley during a week or so of the driest weather in May, 1903, there were four “well sweeps,” each with a five-gallon kerosene-oil can attached, operating nearly all day, pouring water from a canal into sementeras through sixty or eighty feet of small, wooden troughs.

24. THE ORIGIN AND DISTRIBUTION OF AGRICULTURE
IN AMERICA¹

By H. J. SPINDEN

Agriculture may be named as the antecedent condition for all the high cultures of the New World. The concept of agriculture may have had several points of origin, but this does not seem likely, since maize, beans, and squashes were common products wherever agriculture was practised in America. Other plants, fitted for special environments, had a more limited distribution, examples being manioc (*Manihot utilissima*, etc.) of the humid lowlands of the Amazon basin and of the West Indies, and the potato (*Solanum tuberosum*) that was cultivated most extensively in the rather arid highlands of Peru. Wild stocks for some of the aboriginal food plants of America are often difficult to obtain, but botanical knowledge is far from complete for some of the most significant areas. We have proof of the migration of the agricultural complex from Mexico into the United States. In both the Mound Area and the Pueblo Area, the comparatively high state of society and art was directly dependent on agriculture, yet in these areas not one food product is known to have been locally developed from an indigenous plant. While the concept and the complex of agriculture undoubtedly migrated from Mexico into the southern and eastern parts of the United States we must be careful not to confuse this phenomenon with an actual migration of peoples. There is no reason to doubt that the plant culture spread as rapidly and as easily across tribal barriers in ancient times as horse culture in modern times.

There are arts that seem in a general way to be dependent on agriculture or at least concomitant with it. The most important of these is pottery. Pottery is of little use to people who are not stationary, and stationary people are usually (but not necessarily) agriculturists. In the New World we find that the boundaries of pottery distribution closely parallel the boundaries of agriculture distribution, extending in some regions slightly beyond them. Now pottery, with its infinite variation in form and ornament, furnishes us evidence of cultural connections and cultural developments that can be considered profitably along with problems of ancient American food plants.

If we could be certain that the early Mexican culture, now called the Archaic, was the direct outgrowth of the invention of agriculture and the subsequent stabilization of society, our position in regard to certain funda-

¹From H. J. Spinden, The Origin and Distribution of Agriculture in America, in *Proceedings of the 19th International Congress of Americanists*, pages 269-276, Washington, 1915.

mentals of ancient American history would be very strong indeed. This Archaic Culture, studied best in its ceramic remains, seems to have had its birth on the highlands of Mexico and to have spread without much change as far as the Isthmus of Panama. Maize (*Zea mays*) seems to have been developed from a wild grass which may be the teosintli (*Euchlœna mexicana*) of the Mexican highlands. When we consider the geographical and climatic range of the adaptation of maize we must admit that the Mexican plateau is an intermediate and very likely home for the wild progenitor of this great food plant. On the north its cultivation had been extended in pre-Columbian times to the mouth of the St. Lawrence and on the south to the mouth of the Rio de la Plata. The plant had been accultured to extreme conditions of heat and cold, drought and moisture. To be sure there is in artificial cultivation, even when practised by primitive people, an obvious selective character that might rapidly lead to a differentiation of plant types. The saving of seed stock after any harsh condition has operated to cut down the yield naturally breeds immunity to that condition. Still it is much more reasonable to suppose that modification would take place from a mean toward each extreme of adaptation rather than from one extreme to the other.

It is certain that the early ceramic art of the Archaic Period was made by a people who practised agriculture. And it is becoming more and more clear that the migration of this ceramic art can be traced well into South America, although changes take place once we pass beyond the frontier of tribes speaking the Nahua language. The writer has presented evidence elsewhere that the widely scattered tribes speaking the Nahua language were probably culture-carriers of the archaic art. All these tribes have cognate words for agricultural products, which fact shows that the separation took place after agriculture had been developed.

Theoretically, agriculture would be more likely to originate under conditions that were hard rather than under those that were easy. Necessity, they say, is the mother of invention. An environment producing a healthy but hungry population, particularly a semi-arid environment, would offer special inducements to the first agriculturists. They would have no heavy work in preparing the soil, and irrigation would make them masters of nature.

Irrigation is often looked on as a remarkable sequel of the introduction of agriculture into an arid country. But from the best historical evidence at our command we should rather regard it as an invention which accounts for the very origin of agriculture itself. The earliest records of cultivated plants are seen in Mesopotamia, Egypt, Mexico, and Peru, where irrigation was practised, and in each region are likewise seen the earliest developments of the characteristic arts of sedentary peoples, namely, pottery and weaving, and the elaborate social and religious structures that result from a sure food supply and a reasonable amount of leisure.

Quite aside from these known facts in the case, there are several reasons why we should look for the first appearance of agriculture in an arid environ-



Map 1. Pottery in the New World. Intensive regions in black; non-pottery regions in white.

ment. The press of population on food supply is greater there than in free-and-easy lands where nature is bountiful but where an insidious competition works behind the screen of plenty and cuts down life. In the desert the clearing of the field is less laborious than in the jungle and the control of the life-giving water makes man the master of the entire situation. As for the intermediate type of environment, where agriculture is possible without irrigation and where it normally spreads with the rise of human culture, there is usually such a supply of wild game, of berries, of edible roots, etc., that the advantage of tilling the soil does not at first appear. Even when agriculture is known in such favorable country, the indigenous plants are seldom found in cultivation. The abundant harvests of wild acorns in California, of wokus in southern Oregon, of wappato along the Columbia, of camas and kous in the pleasant uplands of Idaho, and of wild rice in the lake region of Minnesota and southern Canada, were effectual barriers against the invention or spread of agriculture among the tribes inhabiting these regions. . . .

Map 1 shows the final distribution of pottery in the New World. Aside from the independent development of crude ceramic art among the Alaskan Eskimo, the whole grand area may show the result of a spreading-out of the pottery concept from a single point of origin. Everywhere in this great stretch of territory the use of pottery is practically limited to agricultural peoples. The area is, to be sure, somewhat larger than that held by the agricultural tribes of today. The oversize can be explained on two grounds. In some regions the pottery remains are scanty and sporadic and may be ascribed to nomadic Indians who made a slight use of the pottery objects manufactured by their sedentary neighbors. In other outside regions the pottery remains are so plentiful as to indicate that agriculture was once practised there but has now been given up. For instance, there was never more than a slight use of pottery in the western stretches of Kansas, Oklahoma, and Texas, where the nomadic Kiowa and Comanche dwelt, at least in later times; while in southern Colorado and southeastern Utah, a rather high type of agriculture was once established but has long since given way to a ruder manner of life.

In South America the southern limits of pottery have never been carefully worked out. Potsherds at old Tehuelche camp sites are reported from considerably farther south than agriculture appears to have spread. The two non-pottery areas marked on the map in the central part of the continent are somewhat uncertain. Throughout the area drained by the Amazon and Plata systems pottery-making and agriculture follow the larger streams, whose banks are held by the better tribes. But in the higher land back from these streams much more primitive tribes are found, such as the Ges of the Brazilian highlands and the Nambiquara of the Matto Grosso. The latter practise a little agriculture at the present time, but hardly deserve the name of agriculturists.

Map 2 gives the limits of the distribution of agriculture in the New World and makes a rough distinction between three general types of agriculture.



Map 2. Agriculture in the New World. Mountainous and mostly arid regions in black; lowland humid regions stippled; temperate region in lines.

The first and apparently oldest type occurs in open and rather arid territory of considerable elevation, where irrigation is usually necessary. The second type is found in the humid, tropical lowlands where the land must ordinarily be cleared of the forest before planting can be done. The third type occurs under temperate conditions in partly open and partly forested country where irrigation is not required.

The arid highland area extends from southern Colorado and Utah down the cordillera and over the plateaux of Mexico, Columbia, Peru, and Bolivia, to southern Chile. An outlying area is also drawn across the Guiana highlands, but this is somewhat doubtful and proof of its existence must await future exploration. Much of northern South America, back from the coast, is savanna and sparsely timbered plain.

Agriculture seems to have received special emphasis in Mexico and Peru. Maize, beans (*Phaseolus vulgaris*), squashes (*Cucurbita maxima* and *C. pepo*) are common to both areas, but with considerable local variation. Sweet potatoes (*Ipomæa batatas*, the *camotl* of the Aztecs) are also cultivated in both Mexico and Peru, but are probably of humid lowland origin. In Mexico several varieties of *Capsicum annuum* (known to us by the Aztec word *chile*) were cultivated, as well as the tomato (*Lycopersicum esculentum*), called *tomatl* in Aztec. The latter was used mostly in softening the rigors of chile sauce, and several varieties are described in early books. Cacao (*Theobroma cacao*) takes its mispronounced name from the Aztec word *cacauatl*, which referred to the dried nibs. When ground this fruit seed was called *chocolatl* and was made into a delicious drink. Cacao was grown under the shade of another tree, called the "mother of cacao," in the lower and more humid parts of Mexico and central America, and was an object of trade with the highland tribes. This plant does not seem to have been known to Peru, although the mountain tribes of western Venezuela cultivated it and made a drink called *chorate* from the seeds. Cacao was grown also in many parts of the lowlands of South America and in the West Indies. It is likely that more than one species has been brought under cultivation.

In Peru, the potato (*Solanum tuberosum*) was especially developed. It is doubtful if this plant was known to the Mexicans, although it was commonly grown throughout the Andean region and a wild form occurs as far north as Colorado. Peanuts (*Arachis hypogæa*) also appear to be a Peruvian specialty. There was a sort of fruit called by the Aztecs *tlalcacauatl* ("earth cacao"), which is said to have been roasted before eating. This fruit may possibly be identified with the peanut, since the modern Mexico word for peanut is *cacahuate*. In South America the Peruvian word *mani* is used. Several wild species of peanuts are said to occur in South America. Other Peruvian and Columbian products are the roots of oca (*Ocalis crenata* and *O. tuberosa*) and of arracacha (*Arracacia xanthorrhiza*). Great use was also made in Peru of the seeds of quinoa (*Chenopodium quinoa*). In Mexico dry seeds of similar type appear to have been used in quantity.

The second type of agriculture is that developed to meet the conditions of the humid and heavily forested tropics. The Maya culture, probably the most brilliant of the New World, was made possible by the agricultural conquest of the rich lowlands of Central America. On the highlands the preparation of the soil is comparatively easy owing to scanty vegetation and a control vested in irrigation. On the lowlands, however, great trees have to be felled and fast-growing bushes kept down by untiring energy. But when nature is truly tamed she returns recompense many fold to the daring farmers. Moreover, there is reason to believe that the removal of the forest cover over large areas affects favorably the conditions of human life which under a canopy of leaves are hard indeed. . . .

But while extremely high civilization might result when the natural wealth of the humid tropics was garnered by a closely organized people, the general run of more or less haphazard agriculture in the tropics leads to no such state of affairs. In the great Amazon valley and in the flanking valleys of the Orinoco and the Plata, we find agriculture unaccompanied by high social developments, although weaving and pottery-making are everywhere practised. Maize, beans, and squashes are known throughout this area, but maize is displaced from the position of first importance by manioc. Two species of this plant are used, one (*Manihot utilissima*) having a poisonous juice and the other (*M. aipi*) being harmless. Both plants, along with many other species of the same family, are said to grow wild in Brazil, and there is little doubt that domestication first took place in this area. A single technical process of extracting the poisonous juice of the favorite manioc is found wherever the plant is cultivated, and similar types of clay griddles are used in making the cassava cakes. . . .

While the general classification of tropical agriculture into arid highland and humid lowland types is hardly to be disputed, still there are many domesticated plants that cannot be definitely ascribed to the one environment as opposed to the other. It seems likely that maize, beans, squashes, potatoes, tomatoes, malanga (*Xanthosoma sagittifolium*), etc., were originally of humid land origin. . . .

The third type of agriculture was adapted to temperate conditions. It is most completely exemplified in the eastern half of the United States, but seems also to have been developed, though to a much less extent, in parts of the Argentine and Uruguayan pampas. Maize is again the staple, with beans and squashes as associated crops. Among the Mandan of North Dakota maize was modified to meet the conditions of a very short summer and ripen within sixty or seventy days of planting. Among the Iroquois agriculture was also brought to a high plane, especially when we consider that all the plants under cultivation were indigenous to the tropics.

25. THE INFLUENCE OF THE HORSE IN THE DEVELOPMENT OF PLAINS CULTURE¹

By CLARK WISSLER

One of the important problems pertaining to the Indians of the Plains is the relation of the European horse to their culture. The initial difficulty lies in our inability to determine the precise dates at which the successive tribes came into its possession. . . .

The great Spanish expeditions to explore the southern parts of the United States were well equipped with horses and even cattle and hogs. The adventurers were cavaliers; hence, horses were a necessity. De Soto carried some of his horses across the Mississippi in 1541. At about the same time Coronado reached the present bounds of Oklahoma from Santa Fe. Oñate is believed to have visited the Pawnee and Kansas, 1599-1601, and Peñalosa conducted an expedition to the Mississippi in 1662. From Coronado's time on there was a growing trade with the Indians of the Gulf coast, and trade to the interior from Santa Fe as a base began about 1600. The pueblo village of Taos soon became the trade center for the Plains Indians. This trade seems to have reached its maximum about 1630. Doubtless the archives of Mexico and Spain contain data on the trade of this period, but nothing definite has so far found its way into literature. It is known, however, that the Indians of the Plains and especially the Pawnee were so troublesome in their plundering raids for horses that a post was established in Kansas about 1704 and an unsuccessful expedition undertaken by Villazur in 1720. Yet, in 1719 du Tisné, a Frenchman, visited two Pawnee villages in Oklahoma where he counted three hundred horses. As early as 1682 Henri de Tonty found horse-using Indians on the lower Missouri. La Salle also states (1682) that the Gattacka (Kiowa-Apache) and Manrhoat (Kiowa?) had many horses. In fact they found horses in many places. This is about the earliest date we can hope to find for the Missouri, but if the horses were there at that time, it is most certain that the Pawnee were well provided with them. It seems, therefore, safe to conclude that some time during the interval 1600-1682, at least, the Caddoan tribes, the Tonkawa, and the Comanche, as well as the Kiowa, became fully equipped with horses. The Metontonta (Oto) came to see La Salle and brought a horse's hoof, stating that the Spanish made war upon them (1680). From the statements by Hennepin we infer that the Oto did not use horses at that time.

¹Extracted from the article of the same title, *American Anthropologist*, new series, volume 16, pages 1-25, 1914.

It is thus clear that the Indians below the Platte and lower Missouri were quite well supplied with horses by 1682, and there is no reason why many of them should not have had horses as early as 1600. Presumably those to get them first would be the Ute, Comanche, Apache, Kiowa, and the Caddo. As we move northward our historical data become a little more definite.

The sons of La Verendrye made a journey to the Rocky mountains from the Mandan in 1742-43. They encountered horse Indians, also mules and asses, and on their return to Canada mention the horses of their Assiniboiné companions. On this journey to the Rocky mountains they seem to have passed down west of the Black hills and to have reached the mountains in Wyoming or Colorado and on the return trip to have struck the Missouri in Nebraska or South Dakota. They were in fear of the Snake Indians. So far we have not been able to fully identify the tribal names of these explorers, but Beaux Hommes seems likely to be Crow, and Gens de l'Are to be Cheyenne. Their "Le Grand Chef" was evidently the chief of the Pawnee, and the Chevaux, the Comanche. They fell in with the Prairie Sioux on the return trip. On one point they are definite: that horses were in use all along their route after they left the Mandan country.

Next we turn to the journal of La Verendrye's Mandan discoveries, 1738-39. He set out from a camp of Cree on the Assiniboiné river and made the journey overland with a body of the Assiniboiné. It is clear that the whole party were afoot, for "the women and dogs carry all the baggage, the men are burdened only with their arms; they make the dogs even carry wood to make the fires, being often obliged to encamp in the open prairie, from which the clumps of wood may be at a great distance." No mention of seeing horses among the Mandan and the adjoining villages is made. On the other hand, we are told that the Indians gave him to understand "that the Pananas and Pananis had horses like the whites," living to the south of them. One of his Assiniboiné companions narrated an engagement with horsemen in armor while his party was in a raid to the Mississippi. Yet, in 1741, when the sons of La Verendrye set out toward the southwest, their statements seem to imply the possession of horses by the Mandan and the neighboring villages.

A little later (1751) Saint Pierre states that he saw horses and saddles which the Indians obtained by trade from the west, and notes a report from Fort Lajonquière in the Blackfoot country that the natives there traded for horses and saddles to the westward. This is the earliest suggestion of horses among the Blackfoot peoples. . . .

For the Dakota and other tribes above the mouth of the Missouri we seem to have negative evidence. As early as 1662 Radisson met a division of the Eastern Dakota in Wisconsin, and from his own quaint account of the manner of transporting baggage it is clear that there were no horses there. These Indians were, it is true, not a typical Plains people, but Radisson tells of journeys to the Mississippi and to the vicinity of the Mille Lacs where he met other Indians of their kind. Nowhere have we noticed any implication that

horses were known. From 1665 to 1699 Nicolas Perrot was in frequent contact with the Siouan tribes, but we find in his account no suggestion of horses. Le Sieur penetrated the country of the typical Plains Dakota in 1700, and, though he goes into much detail, we find no hint of horses being in the vicinity. Before his day neither Hennepin nor Du Luth mentions them for the Sioux country.

Then we come to the journal of Peter Pond, 1740-45, where we are told that the Yankton division of the Dakota had horses in abundance:

"They Have a Grate Number of Horses and Dogs which Carres there Bageag when they Move from Plase to Plase. . . . Thay Run down the Buf-felow with thare Horses and Kill as Much Meat as thay Please. In Order to have thare Horseis Long Winded thay Slit thair Noses up to the Grissel of thare head which Make them Breath Verely freely. I Have Sean them Run with those of Natrall Nostrals and Cum in Apearantly Not the Least Out of Breath."

Turning again to the Mandan we have no literature until 1804 when Lewis and Clark wintered among them, at which date all the Indians of the Missouri were well supplied with horses; together with the Arikara and Hidatsa they were trading horses and mules to the Assiniboine and Teton Dakota. However, in the journal of J. McDonnell (1793) we are told that at the Missouri the natives used horses to hunt buffalo.

The result of our survey is then quite definite. Horses were numerous among the Blackfoot as early as 1751, and they were used by the Assiniboine about the same date. They had not been acquired by the Mandan in 1738, but were among their immediate neighbors to the south. They are first definitely mentioned for the Teton Dakota in 1742, and for the Yankton at about the same date. The Iowa seem to have had some horses in 1724. . . .

If these dates for first mention of the horse are tabulated or plotted on a map, we have a progressive series northward, beginning with 1682 and culminating on the Saskatchewan in 1751. In every case, however, we must assume an earlier date for its introduction. There is no good reason why the Pawnee should not have had horses in 1650 or even in 1630, since they were available in the Spanish and Pueblo settlements of New Mexico. . . .

In this connection we may give brief consideration to the use of horses east of the Mississippi. From the very first, the Spaniards were great importers of horses and other domestic animals. In this respect they stand in contrast to the French of Canada where the first horse (just one) was imported in 1647, the first cargo in 1665. The English colonists imported horses moderately, except in Virginia, where the cavalier element, as among the Spaniards, brought in the horse, and where in 1669 wild horses became a pest. The first horses imported by the New England colonies came in 1629. Horses spread among the Indians of the Atlantic slope, but it was only in the south that they were numerous. According to Adair the Cherokee and other southern tribes were good horsemen. While these Indians could have secured their

stock from Virginia, it is much more probable that they first came from Spanish settlements on the Gulf and even from the tribes west of the Mississippi. According to Swanton, Du Pratz and others speak of horses as numerous in the south and note that they seem a different variety from the European horse, which suggests the Indian horse of the west.

Adair gives us a good description of the riding gear of the Choctaw and other southern Indians. They had the rope for a bridle, made saddles with wood and green buffalo hide, and mounted from the "off-side," in all of which he recognizes the Spanish type and which reminds us of the Plains. Even the saddles made by the Iroquois of New York are of this same western Indian type. All this strongly suggests that the dominant traits of horse culture among all the south Atlantic Indians came from across the Mississippi, or at least indirectly from the same source as the western culture. The ultimate source was most likely the Spaniards. The French are a negligible factor because they settled at the mouth of the Mississippi after the horse had reached the Missouri. Even the English settlements in Virginia scarcely reached a point where they could supply horses to the Indians of the east before horses are reported in the west. It seems therefore clear that the Spaniards must be credited with the introduction of the horse to the Indians of the Plains and the lower Mississippi both east and west; the greater number of horses must have come from their more numerous settlements in the Southwest and Mexico. . . .

The phenomenon we have is now plain: Indian horse culture spread rapidly from the Spanish settlements of the Southwest and Mexico upward between the Rocky mountains and the Mississippi river, and thence northward between the Missouri and the mountains, to the west of the Black hills and thence to the Saskatchewan country. On the south it spread out over the Gulf states, but did not become prominent north of Virginia, or between the Ohio and the Great Lakes, and reached the Upper Mississippi relatively late. It reached the lower Colorado on the west, but did not reach far into California or any part of the Pacific coast to the north. Likewise it reached up into the Plateau area, and even to the Déné area.

The subject we have chosen for discussion is the relation of horse culture to other Plains traits and not the historical investigation of the introduction of the animal by Europeans. The preceding data are presented solely to define the problem and make no claim to completeness. However, we cannot well discuss the influence of horse culture without fixing its relative time of origin, for, if it greatly preceded other strong European influences, its value as a cultural characteristic is high. While the fixing of such a date is quite speculative, we have its limits clearly defined, for we find the horse in the far north in 1751 and know that it could not have reached the Indians before 1500. . . .

Thus we may ask—

1. Is the Plains culture as a whole older than the introduction of the horse?
2. What changes in culture traits can be attributed to the influence of horse culture?
3. What had the environment to do with the distribution of horse culture?

If we take up the first and look for traits older than the introduction of the horse, we can lay hands upon at least one such. The use of dogs for transporting baggage is mentioned by Coronado's men, a date before the era of the horse. Furthermore, we have linguistic evidence in the names for horse, such as "mysterious dog" and "elk-dog," certainly implying a resemblance in the uses of the two animals. We should expect no one to doubt the assumption that dog traction, one of the most distinctive traits of Plains culture, was fully diffused over the area before the horse was known.

As to the tipi in the form familiar in the nineteenth century, we are far less certain. Obviously dogs could not have transported the tipi of horse days with its long heavy poles and bulky cover. Descriptions of the tipi have not been found by us at a period when the horse was unknown. The tents mentioned by Castañeda appear to be tipis, but we cannot be sure of their detailed structure. They were, however, transported by dogs. The distribution of the tipi among a few of the Central Algonkin and its analogous forms to the eastward among the Cree, may warrant a guess that it was diffused over the Plains in some form along with dog traction; but a mere guess will not help us here. However, in another place we have called attention to the apparent relation between the travois and dragging tipi poles. The horse travois is made of tipi poles and the few dog travois we have seen had their poles pointed at the butts precisely like the tipi poles. Yet the true travois was found in the northern part of the Plains; the tribes of the south placed the load upon the horse and dragged the tipi poles at the sides. In Castañeda's time this was the way for dogs. In short, there are several reasons for assuming that the northern travois was developed from the tipi poles dragged by dogs. If we accept this explanation, it is clear that a tipi of some form and the travois are historically associated and that the former is the older.

Turning to less material things we may cite the coup and methods of warfare. It would seem that since almost everywhere in the Plains a war party set out on foot, even though they went after horses, it is safe to assume that the entire procedure had become a fixed custom before the advent of the horse. The coup is so fundamental a matter in the warring system of the Plains that it also must have been there for a long time. . . .

If we turn to some of the intermediate tribes, like the Mandan, we can prove by archeology the existence of the earth-lodge before the horse. Maize also was among the Mandan. It seems most certain that Mandan culture was essentially developed long before 1738.

The net result of this survey is, then, that we have positive evidence of the dog travois development before the horse, but that on other traits of culture we have only presumptions for the area at large. . . .

We may recapitulate then by stating that while there is a presumption that the horse stimulated periodic ranging on the Plains, there were other factors capable of exerting similar influences; but that actual migration was due to the horse is quite unlikely. The existence of former periodic ranging is proven by historical evidence in some cases and made inferential in others by the previous development of dog traction. In short, we may say that only those traits directly associated with the horse can be taken as later; the most characteristic traits, for want of evidence to the contrary, must be given priority, and that while the horse along with other European influences may have intensified and more completely diffused the various traits, there is no good evidence at hand to support the view that the horse led to the development of the important traits. In other words, from a qualitative point of view the culture of the Plains would have been much the same without the horse. It does not follow though, that these Plains traits were diffused over the same area as found in 1850. For example, the characterization of the southern Plains Indians in the Icazbalceta manuscript can scarcely be improved upon as defining the Plains type of culture, but we have no way of determining its extent.

We may be reminded that in the Plains area are several subtypes of culture. There are first of all the nomadic tribes of which the Blackfoot, Crow, Teton, Kiowa, Arapaho, Cheyenne, and Comanche may be taken as types. These are the great horse and buffalo Indians as we know them. They ranged north and south in the true plains while on either border were tribes of less intense culture and varied by additional traits. Our problem, therefore, is as to whether the development of this typical group in which the horse seems so important a factor did not occur after the acquisition of the horse. If so, then the true Plains culture may properly be said to have developed with the introduction of the horse, even though every trait may have been in existence somewhere in the area long before. A rather extended argument could be presented on this point, but a few suggestions must suffice.

1. Though true migration since horse days is rare, there is a very strong presumption that several of these typical tribes had scarcely reached their historic ranges by 1600; and in that event could scarcely have developed their present culture before the horse came.

2. The high tide in typical Plains culture seems to have come in the eighteenth and nineteenth centuries. While this was the era of trade, yet the horse increased the economic prosperity and created individual wealth with certain degrees of luxury and leisure; also it traveled ever ahead of white trade and the white trader.

3. The horse was a great inciter of predatory warfare which must have increased the range and intensity of operations, thus intensifying tribal contact and increasing intertribal knowledge, all of which would favor diffusion.

4. The culture of these tribes takes its individuality from apparent adjustments of traits to a more nomadic and intense form of life, the practical inhibition of such traits as pottery, basketry, agriculture, and fixed houses; rather than from the introduction of any new traits except those directly associated with the horse.

Hence, we may formulate for further consideration the proposition that while no important Plains traits except those directly associated with the horse seem to have come into existence, the horse is largely responsible for such modifications and realignments as give us the typical Plains culture of the nineteenth century, or which differentiate it from the subtypes in the same area. Thus we can see how practically all the essential elements of Plains culture would have gone on, if the horse had been denied them; but it is difficult to see how the vigor and accentuated association of traits forming the typical group and their intense occupancy of the true plains could have been what it was in 1800 without the horse. A type of culture, we should note, is the conception of an associated group of traits, and it is the manner of the association rather than the identity of the traits that determines it.

We may now turn to a more specific examination of the point as to what distinct modifications of culture were produced.

In the first place, the horse brought with it all its own associated elements of culture. Our collections show that saddles and other riding gear are quite uniform in type for the Plains and are on the whole after Spanish patterns. Even the use of the reata seems to be of Spanish-American origin. Riding itself was, of course, intrusive. Knowledge of how to care for horses would also come in from the Spanish. So we must surely have had a whole group of associated culture traits carried along with the horse.

Thus we have a fine example of diffusion, like the sun dance, men's societies, etc. Could we show that the diffusion of horse culture preceded the diffusion of these other traits, we should have a strong case for the horse as a modifier of culture. As we have seen, what little evidence there is points in the other direction. . . .

While the problem we have discussed is far too complex to permit a paper of this kind to be more than a suggestion of new lines of research, the following conclusions seem permissible: The horse reached most, if not all, of the typical Plains tribes from three hundred to two hundred years before they lost their cultural independence. In its diffusion over the area a large number of associated traits were carried along as a whole, or as a cultural complex. At least some of the tribes had developed dog traction to meet their nomadic wants before the horse came, and needed, therefore, but to substitute the horse for the dog in their own dog-culture complex and to take over the necessary parts of the Spanish horse-culture complex. Thus among the less sedentary tribes the whole basic structure of the later horse Indian culture was in existence when the horse came. We have found no reason to believe that the introduction of the horse did anything more than intensify and perhaps more

completely diffuse the cultural whole previously formed. As such, however, it seems responsible for reversing cultural values in that the earlier dominant sedentary cultures of the Siouan and Caddoan tribes were predominated by the Shoshone and other formerly struggling nomads of their old frontier. As the leading horse carriers, the Shoshone played a large part in this development, but they lacked many of the strong cultural traits which the Crow, Teton, etc., received from the original Plains culture, in consequence of which they now fail to qualify as typical tribes. Finally, it appears probable that the accidental presence on the New Mexican frontier of a well-developed dog-traction culture was the chief determining factor in the direction of horse-culture diffusion though there were other ethnic factors as well as environmental conditions that could have contributed to the result.

26. ARCHITECTURE OF THE ANCIENT MAYA¹

By W. H. HOLMES

The Maya Race. At the period of conquest the Maya tribes, occupying the peninsula of Yucatan and considerable portions of neighboring territory to the south and west, are said to have comprised in the neighborhood of 2,000,000 souls. Today they are distributed over nearly the same area, but are reduced in numbers, it is estimated, to less than 500,000, half at least of whom continue to speak the Maya tongue in its purity. At the north where there has been much infusion of Spanish blood the race has been largely modified and an interesting and very homogeneous half-blood people has sprung up; but in the interior many of the tribes are of nearly pure blood and retain a strong spirit of independence. It is said that some bands have never been fully conquered and they practically substantiate the claim by holding the temples of their fathers by force of arms, defying all comers, whether white or red. . . .

In the culture scale this people stood at the head of the American tribes. They were still, properly speaking, barbarians, but in several respects seemed to be on the very threshold of civilization. Their status may be compared to that of the Greeks and Egyptians immediately preceding the dawn of history, and we may assume that they were, as measured by Aryan rates of progress, perhaps not more than a few thousand years behind the foremost nations of the world in the great procession of races from savagery toward enlightenment. It is certain that they were already employing a rude system of historic records and were the only nation on the western continent that had made any considerable headway in the development of a phonetic system of writing. Their hieroglyphics occupy a place, not yet well defined, somewhere along the course of progress from pictograph to letter, and are consequently difficult of interpretation. There is no doubt, however, that an age of literature was actually though slowly dawning in America when the shock of conquest came. . . .

Today the chief reminder of the great past of the Mayas is the crumbling remains of their architecture, but remarkable advance had been made in several other arts not embodied in such durable materials. They made paper of maguey, and their books, several of which have been preserved and are now

¹From pages 19-52 of W. H. Holmes, "Archaeological Studies among the Ancient Cities of Mexico," part I, *Field [Columbian] Museum of Natural History, Anthropological Series*, volume 1, number 1, 1895.

in the libraries of Europe, show advanced skill in pictographic and glyphic writing, and a fertility of imagination hardly paralleled among the known primitive races of the world. . . .

Monumental Remains. Maya architecture, with its associated sculpture and painting, constitutes the best remaining index of the achievements of the race. The 70,000 square miles of Maya territory are so dotted with the ruins of towns and cities that the traveler is seldom out of sight of some mound, pyramid or other massive structure. The preservation of these remains is wonderful, considering the four hundred years of decay and destruction through which they have passed. There is hardly a modern village or town on the peninsula of Yucatan that is not built in some part of materials derived from the ancient structures. Yet the work of demolition still goes on, and presently, unless the Mexican government takes adequate measures to preserve them, the traces of a conquered race and its strange art will exist only in books. Nature has vied with man in the work of leveling the noble monuments with the ground. The luxuriant vegetation which envelops the ruins sends a multitude of strong roots deep into the masonry at every vulnerable point; growing rapidly, they act like wedges, separating masses and aiding gravitation and the elements in their never-ceasing efforts at destruction. . . .

Building Materials. The nature of the materials at the disposal of a people inclined to building exerts a profound influence upon the results achieved. Stone of somewhat decidedly favorable qualities would seem almost essential to greatness in the art of architecture. The Mayas were especially favored in this respect. The peninsula of Yucatan is composed of massive beds of limestone, homogeneous in texture and easily cut, even with primitive tools. Nature had not only supplied the stone, but it had in some measure prepared it for building. Although the land is approximately a plain, it is still in a small way broken up by low ridges and steps, and by sinkage into underground channels. The forests, growing densely everywhere, have broken up the surface beds, giving great quantities of loose stone immediately available to the builder and directing the way to the opening and working of quarries. The presence of unlimited supplies of limestone together with timber made the burning of lime an easy task and this product was extensively employed. The Yucatec stone mason had, therefore, every necessary building material at hand, although he still lacked, in a great measure, materials suited to the manufacture of quarrying and cutting tools. Cherty seams or masses of indurated limestone, occurring in many parts, served for the ruder tools, and picks and chisels of special hardness were probably brought in from a distance. Copper chisels are occasionally found as far east even as Cozumel, but if used at all in the dressing of stone they must have taken an unimportant place in the work on account of the rarity of the material. I had no time to seek the quarries from which stone was obtained in Yucatan, but had the good fortune to come upon excellent examples in Oaxaca. Careful descriptions of these will be given in part II of this paper.

Mortar, made of lime and sand, and cement-like mixtures composed of mortar tempered with gravel, pounded stone, etc., were extensively used, and their durability is remarkable. Numerous floors and roofs are still preserved, and many fine examples of stucco modeling have withstood the destructive effects of the weather for four hundred years or more.

The builders made very considerable use of wood, which, considering the inferior grade of tools available, was cut, hewn and carved with much skill. Wood must have been extensively used in connection with the great stone buildings, as in doorways, in closing spaces between structures now disconnected and in various enclosures and barriers. There is no doubt that pliable vegetable growths, such as poles, bark, vines, twigs, etc., used in textile or semi-textile combinations, were very fully employed in ordinary domestic structures as well as in less pretentious buildings of other classes pretty much as they are today.

Transportation. The gathering of stones and the cutting out of masses from the living rock were followed by transportation, a most tedious and laborious task for a people without beasts of burden and probably without many of the effective transporting devices known to more advanced peoples. The work of carrying the earth, mortar and stones used in hearting the pyramid of the Castillo at Chichen or the triple-terraced pyramid of the Palace at Uxmal was of itself a great undertaking, but the transportation of the countless stones for the facing of both pyramid and superstructure and the lifting of the larger masses employed in columns, jambs, pillars and the like to heights reaching in cases nearly one hundred feet, required strong hearts and hands and a controlling power of exceptional vigor and permanence. The Yucatec Mayas did not, however, undertake to employ stones of enormous size, as did the ancient builders of Mexico and Peru. No block or mass observed was estimated to weigh more than six or eight tons. . . .

Masonry, Stucco Work and Painting. The masonry comprises, in general, hearting and facing. The former consists of earth, mortar and stones variously combined and usually forming strong, well-compacted bodies. The latter consists of stone cut or uncut and laid up, with few exceptions, in excellent mortar. Where the stones were accurately cut, little mortar appears in the face of the wall, but it was freely used in the hearting, and when the facing stones were deep they were dressed somewhat smaller behind, and set back in the mortar as a tooth in its socket. In the facing of many walls, however, the stones were very shallow—often mere tile-like slabs—and had but slight hold upon the body of the hearting.

In those centres of building operations where the limestone was readily worked and of fine, even texture, the facing is well cut, and the wall surfaces are in general so even and true as to stand the test of the square and plumb line; but in localities where the stone is uneven in texture and quite hard, or in provincial sections where building was not carried to a high degree of perfection, the facing is rarely well dressed, save about the doorways, arches,

corners and especially exposed parts. Rough surfaces were very generally evened up with plaster.

A remarkable feature of these structures is the great thickness of the walls, and especially the extraordinary massiveness of the masonry above the spring of the arches. This is clearly shown in several of the sections inserted in the following pages. Where, for example, the outer wall is three feet thick and the arch within is ten feet wide, the mass of masonry thickens upward from three feet at the base of the arch to eight feet at the ceiling level, and in an inner wall, widening both ways, to thirteen feet, so that two-thirds or more of the space included in the upper half of the structure is solid masonry. The roof is often very thick, thus greatly increasing the bulk, and it seems a marvel that collapse from mere weight has not been more frequent than seems to have been the case. To all this bulk were added, in many instances, massive false fronts or colossal roof-combs laden with ornament. So strongly knit is the masonry, however, that but for the decay of wooden lintels, most of the great façades now in ruins would have been very fully preserved. I have computed that a single-chamber structure, with walls of usual thickness and with average arch space and roof mass, would have two-thirds of its bulk solid masonry, which looks like a lavish waste of space, material and labor. If we take the measurements of the Governor's Palace at Uxmal, given by Bancroft, we find by a rough computation that the structure occupies some 325,000 cubic feet of space, upwards of 200,000 of which is solid masonry, while only about 110,000 feet is chamber space. If the sub-structure be taken into account, the mass of masonry is to the chamber space approximately as 40 to 1.

Notwithstanding the success of these Maya masons in erecting buildings capable of standing for hundreds of years, they were yet ignorant of some of the most essential principles of stone construction, and are thus to be regarded as hardly more than novices in the art. They made use of various minor expedients, as any clever nation of builders would, but depended largely on mortar and inertia to hold their buildings together.

One of the most elemental essentials of good work is the systematic breaking of joints in laying one course of stones over another. This idea had hardly been grasped, as it not infrequently happens that a seam or succession of joints is connected almost directly from base to summit of a wall, and at corners, within and without, and about doorways the stones are not bonded at all and are free to fall out as soon as the mortar gives way. The only possible explanation of this condition of the work that occurs to me is that the habit of treating the stones of a wall as so many elements of a mosaic pattern has tended to retard progress in the direction of what is sometimes called scientific construction. It will readily be seen that in carving and laying the stones of a geometric design, as a line of fret-work or of snouted masks, it would be extremely inconvenient to adapt the shapes to any system of jointage, and indeed such a thing would be out of the question.

Another considerable element of weakness in many of these structures was the employment of veneered facing over large surfaces without sufficient headers or long transverse bonding stones. The tendency to break away, even with very thin stones, is in a measure counteracted by giving the back a bevel almost from the face, thus allowing the mortar to come well forward in strong tongues nearly to the surface. In some cases the facing has fallen in a body from considerable areas, exposing the hearting, which presents a remarkably even surface as if built first as a rough wall to be faced up afterward at the convenience of quarrymen and stone-cutters. . . .

It was the practice to finish plain walls in plaster, often rather roughly applied, and nearly all surfaces, exterior and interior, where effect was of consequence, were finished in color. Very often plain surfaces in corridors and important apartments were embellished with graphic subjects, ornamental designs, devices and glyphs in brilliant colors. Sculptures in the round and in all degrees of relief were also colored with great care and elaboration. The range of colors is wide, including black, white and various shades of green, blue, red and yellow. Their composition has not been made a matter of study, but they probably include both mineral and vegetal substances.

As to the methods of manipulating stone, mortar and color, little is definitely known, save through a study of the actual remains. Unlike the Egyptians, who pictured almost everything relating to their own arts and avocations, the Mayas give us but a few hints of these things, both graphic and plastic art dealing almost exclusively with sacerdotal subjects which furnish, incidentally only, hints of practical things. A notable exception is found in one of the Bodleian codexes, where various domestic episodes and illustrations of the practice of ordinary arts are given. Stone, when required in large bodies, was cut out of the mass, probably with rude stone picks, and flaked and pecked into shape at great expense of labor. Very generally the dressed surfaces show the chisel and pick or hammer marks. . . .

I am not able to say with certainty to what extent the dressed surfaces of the stone in the walls of the buildings were ground or polished, but it seems natural that abrading processes should have been generally employed. Hammer stones, sledge-heads, picks and chisels of hard stone are found, but not in the great numbers that might be expected. They are not superior in make to like tools employed by the average American savage, and none of them seem capable of having made the marks illustrated. . . . We are thus led again and again to wonder whether it is not possible that metal tools were used and that traces of their existence, save in the sculptures produced, are wholly obliterated by time.

The lime-burner and the color-man were most important auxiliaries of the Maya builder. Mortar was used in enormous quantities and manipulated with great skill, and the same may be said of color; and the trowels and brushes employed were no doubt such as primitive people usually devise. It should be observed that it was a common practice all over the Mayan, Oaxacan

and Nahuatl territories to finish architectural ornaments, statuary and glyphs, where the stone was not of the finest quality and susceptible of high polish, in thick enamel-like coatings of varied colors which adhered with wonderful tenacity to the stone surface and were polished down with the utmost care, not reducing the relief or distinctness of even the shallowest sculpturings, but being made by skillful manipulation to emphasize and refine these features.

During the great days of temple building the scenes about and within one of these Maya cities must have been exceedingly animated and novel. The hosts of people planning and directing the work; quarrying, cutting, transporting and lifting the stone; burning lime, carrying water, mixing mortar, hewing wood, preparing paints, and engaged in the work of building and decorating, must have furnished scenes in striking contrast with the desolation of the dismantled and forest buried cities of today.

Substructures. The ancient cities of Yucatan were built on plains or on comparatively level ground and were without the advantage of bold natural features, but art largely supplied this want, and no nation of builders, save possibly the Mound-builders of the Mississippi Valley, has ever equaled this people in the number, variety and size of its terraces and pyramids; however, there appear to be no pyramids that are mere pyramids, no terraces that are mere terraces; all or nearly all were constructed to support buildings, altars, or idols, and their diversity of size, contour and position give striking and picturesque results. Usually the substructures are square or rectangular in plan. The largest reported in Yucatan is upward of 500 feet in length and width, and the height of the loftiest reaches nearly 100 feet. The sides slope at various angles and some are practically vertical in whole or in part; many rise in steps, the succeeding terraces or platforms being of equal or unequal height and of varying horizontal extent. As a rule they are or were faced with stone which was dressed smooth or plastered. In the finer structures the terrace faces were paneled in hewn stone or embellished with moldings or with sculptured or stucco reliefs. The corners were often rounded and formed of large and specially sculptured stones. They were ascended by substantial, generally steep and wide stairways on one or more of the sides. The interior mass was constructed of earth and stones or mortar and stones usually forming a solid or well compacted body. In cases, however, this pile was not depended upon as a sufficient support for the superstructure, and foundation walls were carried up from considerable depth or from the ground level. The upper surface was generally floored with cement, though paving with slabs is occasionally seen. No doubt these piles were in cases the result of a long period of growth, and it probably sometimes happened that when a loftier structure was desired ground floor apartments were filled in solid with rubble or masonry, giving firm foundations for a second story or superstructure. In some cases the exterior of vertical-walled substructures was enforced by abutting masonry entirely encasing the original nucleus and giving the effect of an ordinary sloped terrace or pyramid.

In Fig. 1 a few examples of terraces and pyramids are presented in outline. The variety of contour is very great and it may be said that no two specimens are alike. The most unique form is that of the Temple of the Magician at Uxmal, *h*, which is oblong in plan and rounded at the ends; the loftiest is that of El Castillo at Chichen, which is of the stepped type seen in *f*; while the grandest and most diversified in contour is that of the Governor's House at Uxmal, shown approximately in *g*. In *a*, *b*, *c*, *d* and *e* we have what may be regarded as the most common forms. The substructure of the Temple of the Tigers at Chichen, *i*, is peculiar only in being associated with the great wall of the Tennis Court or Gymnasium.

Stairways. The stairways of the Maya pyramids (see Fig. 1), share in a large measure the boldness and magnitude of the constructions with which they are associated and of which they form an essential part. A single stairway would have afforded all necessary access to the lofty summits, but it is not unusual to find two flights, and three or even four flights are known leading to the same temple, and each built on an equally grand scale and finished with like elaboration. All are exterior and centrally placed, leading directly up the face of the pyramid. Usually they are wide and bordered with some kind of solid balustrade. The favorite design for the rail is a colossal serpent, the head with wide open mouth and protruding tongue extended upon the ground, the body, appropriately carved, extending to the summit. In Yucatan the steps are neither high nor wide, averaging perhaps a foot in rise and a little less in tread. The pitch is thus 45 degrees or more. The stones used are generally rather small and not very smoothly dressed or well fitted, and it is probable that all important flights were finished in cement and color. The stairway usually conforms to the slope of the pyramid or shows only a little relief therefrom, but occasionally the angle is reduced, throwing the base out from the base of the pyramid, suggesting the graded way of the Mound-builders. Where associated with a vertical or very steep ascent or a series of rises, it is built out solid or carried over arches, as in the Palace at Chichen. Interior stairways are not found in pyramids and are rare and unimportant in the superstructures; the winding stair in the round tower at Chichen and the several narrow flights in Palenque being perhaps the best known examples. The most interesting stairways met with on the voyage are in the courts of the Palace at Palenque. Here large stones were used, on the faces of which are glyptic sculptures. The evolution of the stairway in its various forms was probably simple and natural and seems to present no problems—no obscure passages—worthy of particular discussion.

Superstructures. I cannot undertake in this place to give more than a mere outline of the leading features and characteristics of the many buildings visited. A few only of the larger structures are built on the ground level of the site, though many are but slightly raised. In some cases the terraces and pyramids have developed in sections by the addition of parts needed to accommodate new buildings, and again, as already mentioned, the supporting pile has been

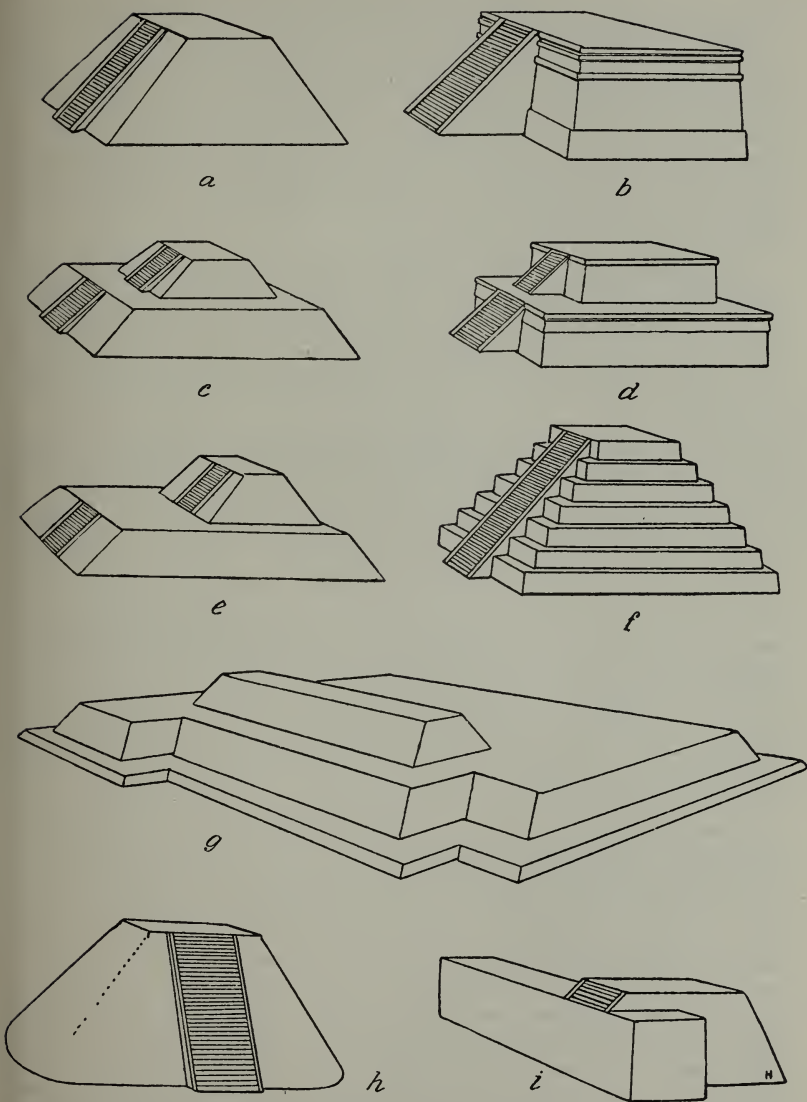


Fig. 1. Examples of terraces and pyramids, superstructures omitted.

built and completed at once to receive the superstructure upon its summit. The plan of the building in the one instance is often composite and irregular and in the other is simple and regular. A number of buildings may occupy a single large foundation mass, and buildings or chambers may occur independently of each other on different levels of the same substructure. In a few cases only, as at Tuloom and Palenque, do we find a second story built above a lower story which has not first been filled up. Where several buildings of different levels are associated, the lower tier stands against the base of the pyramid, the second, back of this, occupies the first terrace, and the third, back of this again, is on the second level.

The ground plan is usually rectangular, two or three examples only of round houses having been reported. Large buildings of independent position are mostly rather long and narrow, the width having been limited by the difficulty of widening the arch where one or two tiers of rooms are used, and of securing light in the inner chambers of multiple tiers, since the upper wall and roof are never perforated. In detail the plan of large buildings, even the most complex, shows little more than a mere multiplication of the simple rectangular cell unit. Exceptions are found in the Round Tower of Chichen and in the corridor-like galleries of Palenque, and, no doubt, also in several multi-columned structures now too much ruined to be fully analyzed.

The buildings usually classed as temples are not large and are generally squarish in plan. They have from one to four roofs. When the rooms are multiple they are so arranged as to indicate pretty clearly a specialization of use. The two essential features in such cases are an outer chamber or vestibule and an inner chamber or sanctuary. The vestibule is entered by a plain, single doorway in inferior structures, and by a wide doorway divided by columns or piers in those of the better class. Usually it extends entirely across the front of the building. The fully developed vestibule is a modified outer chamber, and is characterized by multiple exterior doorways separated by piers or by columns, giving the effect of a portico closed at the ends. The sanctuary is mostly entered by a central doorway, though lateral entrances are sometimes provided. Additional rooms are arranged about the sanctuary at the right or left or extend behind it, as in the case of El Castillo at Chichen. Most of the Palenque temples have an outer apartment of the vestibule type, entered between piers; and a back apartment enclosing a small roofed sanctuary, entered by a single door. Small rooms are placed at the sides. When there is a single chamber only, which is not uncommon, it exhibits frequently the characters of the vestibule. Altars are rarely found, the only example met with being in a small temple on the Island of Mugerres. In Fig. 2 a series of temple plans is given, illustrating the remarks just made. I take it that, if these varied structures are properly called temples, any apartment or any suite of apartments in any building may have served the purposes of a temple, though the term may not with propriety be applied to any structure not showing peculiarity of placement or style, in which there is not some variation from the mere grouping of simple chamber units.

Ordinary doorways are single and give entrance to a single room or, at most, to a suite rarely having more than two or three rooms. Back rooms are entered by doorways closely resembling the outer ones, getting all their light through them. The various forms of doorways are described farther on.

Apartments of all classes and all vaulted spaces are, with a few exceptions, limited in width by the capacity of the native arch to twelve feet or less. The length has no necessary limit, reaching in cases sixty feet or more. Such long rooms may be entered by a number of doorways and thus approximate the corridor type. It is reasonable to suppose that some of the buildings, now represented by piles of debris from which protrude multiple rows of columns, as at Chichen and Aké, were much more expansive in their apartment spaces which were rendered coalescent by the use of columns instead of partition walls. A notable feature of the plan in quadrangular groups of buildings is the gateway or wide, arched passage which opens through one of the outer buildings into the court.

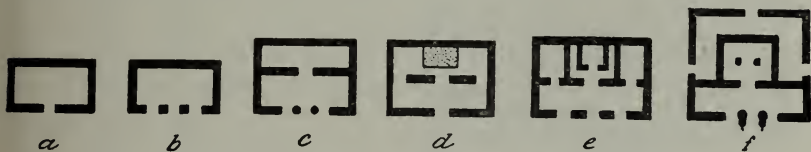


Fig. 2. Specialization of the ground plan of Maya temples.

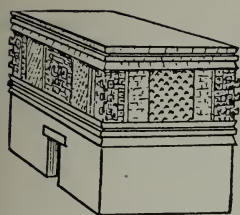
- a. Single-chamber building with plain door.
- b. Single-chamber temple with wide doorway and two square columns.
- c. Two-chamber temple, the vestibule with wide doorway and round columns, and the sanctuary with single plain doorway.
- d. Two-chamber temple, the vestibule with simple doorway, and the sanctuary with three doorways and a low altar.
- e. Four-chamber temple, Palenque type, the vestibule with three entrances and two squarish piers, the sanctuary with tablet chamber, and two small lateral chambers.
- f. Three-chamber temple, Chichen-Itza type, the vestibule entered by wide portal with two serpent columns, the sanctuary enlarged by introducing two square columns to support the triple vault, and a long gallery with three doorways extending behind.

The greater Maya buildings, though at times appearing complex in plan, are really exceedingly simple. The unit is the single cell or chamber seen standing alone in *a*, Fig. 3. The building shown in *b* consists of several units combined in one; variety is given to the plan in unsymmetrical structures by adding other units in less uniform ways and of varying size. The building shown in *d* differs from the preceding in having a sloped instead of a vertical entablature, the interior arrangement being much the same as in *b*. A sketch, intended as a restoration of the Caracol or Round Tower at Chichen, is pre-

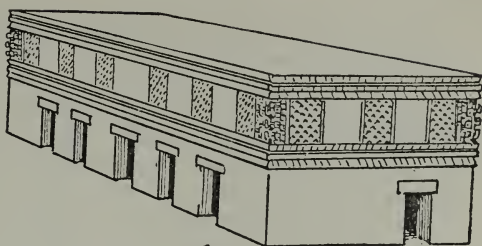
sented in *c*.² This edifice contains two circular, concentric chambers identical in construction principle with the rectangular forms. In *e* we have the Palenque type of temple, and *f* is the square tower of the Palace at Palenque, the plan and construction of which are peculiar in several respects. . . .

The illustration given in Fig. 4 will serve to indicate sufficiently the construction and relations of the various features of an ordinary Maya building. The upper part of the substructure or pyramid is included and shows the stairway at the left, approaching the front doorway, and plain slope at the right. Details of the masonry of this mass are somewhat hypothetical, as I have not been able to determine whether or not it is the rule that a special foundation wall with vertical outer face was built from the ground up, but it is certain that this was often the case, and that the stairway and abutting masonry were afterward added, as here shown, transforming the vertical-faced substructure into a sloping one. The floor is cemented as a rule, but occasionally is flagged, and the inner floor is in cases a step higher than the esplanade without. The superstructure here utilized, has two chambers, or two tiers of chambers, vaulted with the ordinary arch, and the walls are vertical without as is usual in Yucatan. The nature of the facing and hearting is shown in section in the back wall at the right, and the illy jointed and bonded masonry is correctly represented. The use of larger stones in the jambs of the doorways is indicated at the left. At *a* is the plain lower wall with doorway at *b*, and above is a sectional view of the wooden lintels, *c*. The front and back chambers are connected by a second doorway, *d*, identical with the outer one. The sloping sides of the corbellate or offset arch, dressed with the bevel, are seen at *e* and the capstone is at *f*. Special features seen within the rooms are the small, square wall perforation at the right, the poles or braces within the arch above, and two forms of cord fasteners—not large enough to be clearly made out—at the side of the inner door. One pair of these is made by drilling holes from adjoining faces of the stone until they meet, and the other by building a deep depression in the surface of the wall into which is fixed a vertical piece of round stone. The medial moldings, separating the two mural zones, typically developed, are shown at *g*. The upper zone with its sculpture-mosaic surface is seen at *h*, and the upper or frieze molding and coping course appears at the top, *i*. Continuous with the façade plane is the false or flying front, repeating the decorations of the façade proper more or less faithfully, and solid or perforated as the builder pleased or the nature of the ornament suggested. In some cases this feature is repeated in the same form over the medial wall of the building, but more frequently we have a more ambitious roof-comb, as indicated at *k*, and typically illustrated in the House of the Pigeons, Uxmal. It appears that the two forms are not likely to occur on the same structure. Details are given in other connections. In the draw-

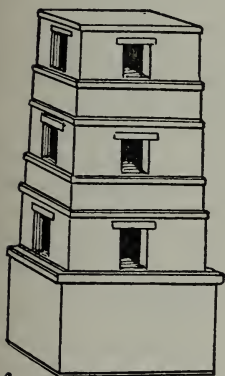
²It seems reasonably certain that the walls of both stories of this building were vertical as indicated, but the number and position of the openings of the upper turret, and the character of the platforms, or roofs, remain problematical.



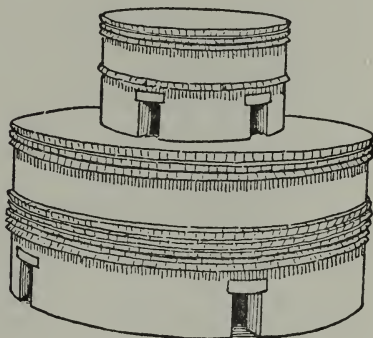
a



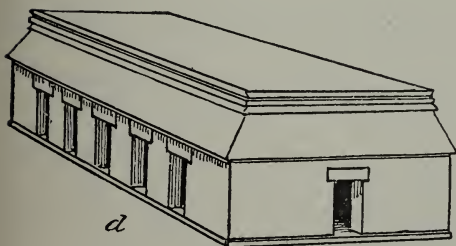
b



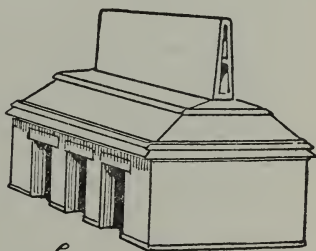
f



c



d



e

Fig. 3. Examples of Maya buildings.

- a.* Single-chamber building—a unit of construction.
- b.* Multiple chambered building—an assemblage of 12 or 14 units.
- c.* Restoration of circular building, Chichen-Itza.
- d.* Building with sloping entablature, Chichen-Itza.
- e.* Temple with sloping entablature and roof-comb, Palenque.
- f.* Square tower of four stories, Palenque—roof restored.

ing the combs are disconnected from the building so that the ordinary roof may be seen in its level simplicity.

Doorways and Other Wall Openings. The wall perforations of Maya buildings may be arranged under six heads. They consist of (1) simple rectangular doorways with jambs, lintels and sometimes sills, (2) multiple or compound doorways in which the wide void is divided by one, two, three or more columns or pillars, (3) arched doorways which are of rare occurrence, (4) certain window-like openings or air holes of small size and varied shape, (5) the diversified openings in flying façades and roofcrests, some representing the interspaces of geometric ornaments, and others resembling doorways in their construction, but serving no function save that of embellishment, and (6) the so-called arched portals or gateways which are not wall perforations in the same sense as the others, but vaulted passageways opening entirely through the building from side to side, and not communicating with the apartments. The latter are described under the heading of *the arch*. . . .

Columns and Pillars. Developing *pari passu* with the doorways and arches we have a great variety of pillars and columns. The American column, in the nature of things, exhibits certain parallelisms with the columns of the eastern continent, but in all departures from the most elementary treatment and use it may be said to be characteristically American. Square columns, most numerous in Chichen, and pillars or piers, typically developed in Palenque, were usually simple in form though often embellished with elaborate sculptures or plastic designs in low relief, whilst the round column had advanced beyond the more elemental form with its shaft and simple cap, and was given, in whole or in part, varied and remarkable life forms, the feathered serpent being the favorite motive embodied. Among the most striking features of the great buildings of Chichen-Itza are the massive serpent columns, and on the Island of Cozumel, in a diminutive temple, the life-sized figure of a human being or man-like ape is sculptured in high relief against the face of the column.

Columns were usually assembled in pairs, where introduced into doorways to support the entablature, but appeared in groups and rows numbering scores or hundreds where extended façades or large roof areas were supported. Few specimens are monolithic, save in the east, as at Cozumel, where the size was reduced to a minimum and the available stone was perhaps more than usually massive. The proportions are considerably varied, but all are short and heavy. The diameter is to the height, approximately, as 1 to $3\frac{1}{2}$. The square column is always built up of a number of heavy blocks.

The round column had become such a familiar feature of the building art that it was employed outside of its normal range of functions, appearing very frequently in the field of pure embellishment. In many of the Yucatec buildings it was used, on a reduced scale, to decorate the façades, where it was effectively introduced in moldings and friezes, forming long rows set in contact side by side. Generally the form was rounded only in front, while

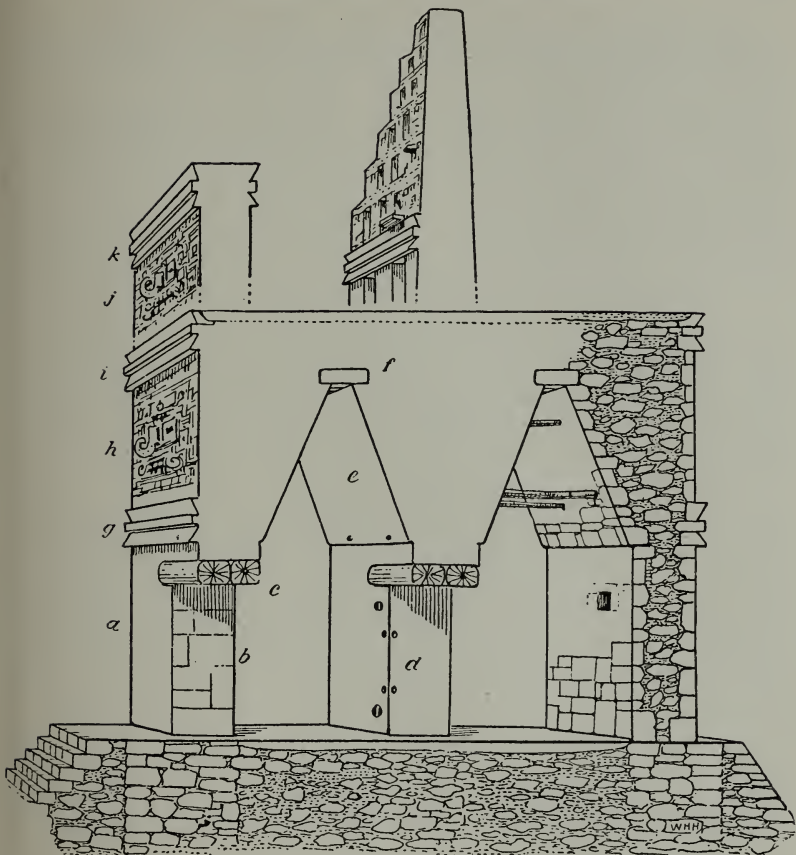


Fig. 4. Transverse section of an ordinary Yucatec building. The upper part of the pyramid is shown with the stairway at the left.

- a. Lower wall-zone pierced by a plain doorway.
- b. Doorway showing squared and dressed stones of jamb.
- c. Wooden lintels cut midway in length.
- d. Doorway connecting front with back chamber and showing position of cord holders.
- e. Inner face of arch dressed with the slope.
- f. Ceiling, or cap-stones of arch.
- g. Lower line of moldings, a survival of the archaic cornice.
- h. Decorated entablature zone.
- i. Upper moldings and coping.
- j, k. False front with decorations (occasionally added).
- l. Roof-crest with decorations (occasionally added).

the back was flat or uneven and set in mortar: The form was varied in cases by formal moldings encircling the shaft, giving the effect, in a simple way, of our turned balusters.

The genesis of the stone column would seem to be easily made out, as prototypes are found in the wooden and stone roof supports employed in most primitive structures. The association with it of animal forms may perhaps be satisfactorily explained on the assumption that the figures or monsters embodied represent the divinities associated with the temple of which the column formed a conspicuous part. This association is in marked contrast with the more rational use of vegetal forms by the Egyptians and Greeks, though animal forms and figures of men and women were occasionally used in those countries. The association of animal forms with portals and columns was more common in the far East. It is notable that the round column was more generally and freely used in eastern Yucatan, as on Cozumel Island, at El Meco, Chichen, and Aké, than elsewhere. At Uxmal I saw no compound doorways and hence no portal columns, and in fact no columns of any kind, and at Palenque heavy flattish pillars, mere sections of the perforated wall, take their place. . . .

The Arch. The Maya arch presents a number of interesting forms and phases, all, probably, directly traceable to the more primitive forms of chamber spans or vaults in common use all over America. Among these earlier forms we have, first, the beam of wood or slab of stone connecting two lateral supports or walls and forming part of the roof or serving to support it; second, the single lean-to, in which the parts are placed against some fixed vertical surface or support; third, the double lean-to, where opposing parts are set against each other with or without a ridge pole; and, fourth, the circular lean-to, in which the parts form a cone with or without a central supporting pole. All are equally elementary, and it will be impossible to determine just which varieties contributed most toward the development of the higher forms of vault in use among the Mayas. There are, however, but two principles of construction involved in all of these spans—the horizontal span and the lean-to. The latter is never used alone but occurs in combination with the former.

The prevailing form of Maya arch is based on the horizontal span, employing not single long slabs, but a series of short slabs so placed as to bridge the void by degrees. A course of stones is laid along the top of each of the opposing walls, projecting a little, a second course is laid in like manner, and others follow until by a series of offsets the sides have approached to within a foot or two, when a course of large well-squared slabs is laid across, completing the span.

In examples employing the lean-to principle, the construction is the same up to the point of connecting the closely approximate walls. Instead of laying a course of flat capstones across, two courses were employed, set on edge on the upper courses of the walls and inclined together at the top, continuing the pitch of the walls and forming the true cuneiform arch. The object of the off-setting is, of course, to reduce the span of the void, thus per-

mitting the use of ceiling stones of small size instead of large and long stones which were hard to obtain and easily broken, or beams of wood which soon decayed. These arches really represent the emancipation of the Maya builder from the thralldom of the wooden beam. The prevailing variety was used in all forms of chambers and also in certain large vaulted passages, as in the Palace at Uxmal, and occasionally in smaller openings, as at Palenque, but the flat span or lintel remained in nearly universal use for ordinary doorways. A unique appearing arch is found at Palenque, the sides being curved in such a way as to give a somewhat trefoil effect to the opening. The principle of construction is, however, the same as in the prevailing form of the cuneiform arch, the profile being curved instead of straight.

It is evident that considerable difficulty was experienced in carrying up the long slopes of the larger vaults, and the high angle adopted was one means of lessening the tendency to collapse. The projecting stones were largely held in place by the masonry of the body of the wall, which was carried up at the same time, but even this, especially in cases where the outer surface was also inclined, could not have prevented the frequent falling of the work when approaching the apex. In meeting this difficulty it was a common practice to use timbers—generally poles of medium or small size—which were placed across and built into the masonry as it rose, holding the walls apart. These beams are preserved in hundreds of cases and nearly every vault shows by its numerous beam sockets that this device was extensively relied upon. I believe the theory is advanced by some writer that a core of masonry was first built of the proper shape, and the vault constructed over it. I doubt if the numerous examples of masonry-filled apartments observed are satisfactory proof of this, but a careful examination of the surface finish in a room so filled might readily settle the question.

In Fig. 5 I present sketches of six examples of the Maya arch. These do not cover the entire ground, but others so far as I have seen are merely variations of the two prevailing types, shown in *a* and *b*, the first, terminating above in two rows of inclined slabs, forming the apex, and the second closed with a course of horizontal slabs. The former is seen in Chichen-Itza, but is rare elsewhere, and the latter was almost universally used in chamber vaults. The specimen shown in *c* differs from *b* only in having the corbellate or offset margins of the stones dressed with the slope, making a plane surface. That given in *d* is identical with the preceding, save that its inclined faces are slightly curved; it is the form sometimes used in the portal vaults which open through one or more of the buildings of a quadrangular group communicating with the court. It is seen also in chamber vaults, in bridges and aqueducts. The fifth example *e* is also a portal vault typically developed in the Governor's Palace, Uxmal; indeed I cannot say that other illustrations are known. The slopes are long and it is probable that they were intended to be straight though now considerably warped, possibly by sagging. The sixth specimen, *f*, is the trefoil arch of the Palace in Palenque, which is the most ambitious attempt at arch elaboration in America, and shows, in connection with kindred wall

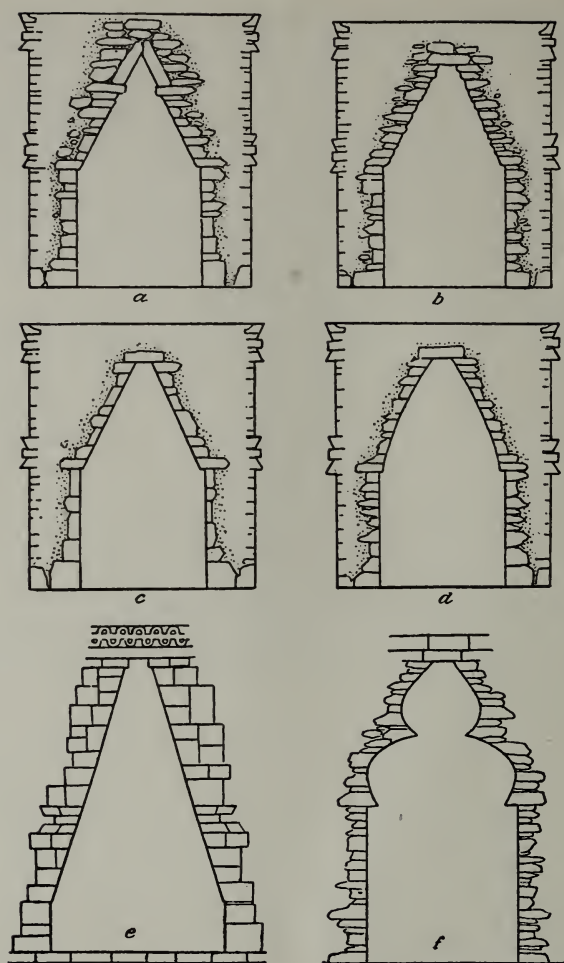


Fig. 5. Examples of Maya arches.

- a. Section of cuneiform arch with acute apex, Chichen-Itza.
- b. Section of ordinary arch with flat capstone.
- c. Section of ordinary arch with dressed surfaces.
- d. Section of ordinary arch with dressed surfaces and curved soffit slopes.
- e. Portal arch with long slopes, showing masonry of exterior facing.
- f. Section of trefoil, portal arch of Palenque.

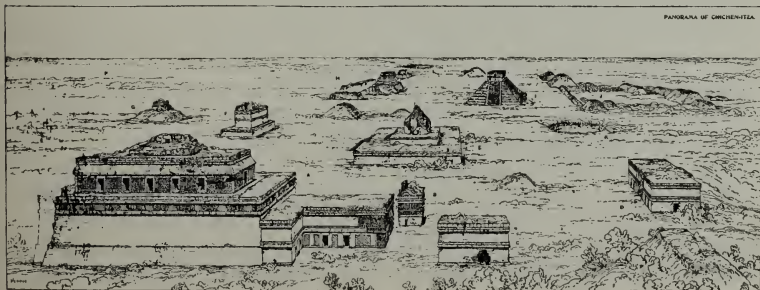
perforations in the same building, an up-hill struggle of the aesthetic in a field where construction was only blindly feeling its way.

The arch was rarely employed in ordinary doorways, exterior or interior, the few cases at Palenque being exceptional. The flat form of opening was preferred because the prolonged apex of the cuneiform arch led to troublesome complications with the interior vaults, as well as with the exterior medial moldings and the ornamented zone of the entablature.

It may be added that in numerous cases all four walls of the chamber are made to approach toward the apex of the vault, thus more thoroughly distributing the thrust of the superincumbent masonry.

The Maya builder did not often essay to construct his arch over a space more than twelve feet wide, though in the loftier buildings a much greater span was possible even with the ordinary pitch of the opposing walls. The average incline appears to be about 65 degrees, but occasional examples rise to 80 degrees, while others fall to 60 or even 55 degrees; the latter pitch would, however, give a weak construction, as the outward thrust would be increased to a dangerous degree. A building twenty-four feet high with roof three feet thick would accommodate a vault twenty-one feet high. If the vertical walls below are carried up to half this height, which is perhaps not far from the average relation of upper and lower spaces, an incline of 65 degrees in the opposing walls, allowing eighteen inches for the capstone span, will give a vault nine feet in width, or nearly ten feet, measured on the floor level, as there is usually an offset at the spring of the arch of from three to six inches on each side.

In the vaulted passageways through the Governor's Palace at Uxmal the incline of the arch begins within a few inches of the ground, so that in the long rise of twenty feet or more, even with the high pitch of 70 degrees, the width spanned is not far from eighteen feet. The highest arch met with in my own investigations is in the outer annular chamber or gallery of the Round Tower at Chichen. The height is about twenty-four feet, while the width is only six feet; the pitch of the vault walls is therefore unusually great, and the apex correspondingly sharp.



27. THE SEMI-SUBTERRANEAN HOUSE OF THE KORYAK OF NORTHEASTERN SIBERIA¹

By W. JOCHELSON

Like the tent of the Reindeer people, the dwelling of the Maritime Koryak is called, besides *li'g-e-yan* ("genuine house"), also *yaya'ñi*. It is an underground, or rather semi-underground, solidly built, permanent dwelling-place. It is of wood, mainly of poplar or aspen, which grows to a considerable height even along the lower courses of the rivers of the Koryak territory. The Koryak float the timber down in summer to the mouths of the rivers; and sometimes they use driftwood. Driftwood carried down by the current from the river-heads may be found mountain-high in the bays and at the mouths of the rivers.

The dwellings vary in size according to the number of inhabitants. Small houses occupied by a family of from five to eight persons may be found frequently. From excavations undertaken by me on the sites of ancient settlements in Gishiga Bay, it appears that in olden times the underground houses were more spacious than those of the present time. Families separated more rarely, and all relatives used to live together. The average number of occupants of one house at present is from six to thirteen. Out of 110 underground houses on the shores of Penshina Bay, of which I took a census, in only one (in the Paren settlement) did I find twenty-one persons, and they comprised two families. According to tales of olden times, there were formerly underground houses occupied by as many as forty persons. Among the Kerek we still find twenty-five persons in one house. A house in Mikino inhabited by fifteen people was found to be 15 metres long (not including the entrance room), 12 metres wide, and 7 metres high. Such a house is somewhat larger than the average present-day underground house; and those but half as large, or even smaller, may often be found.

In order to build an underground house, a circular hole from 1 to 1.5 metres deep is dug, in which the walls are put up in the form of an octagon. The octagon is not equilateral. The sides *a* (fig. 60) are longer than *b*; and the sides *c* are half as long as *b*. Eight poles (*P*) about as long as the height of a man are driven into the ground at the eight corners. Between the poles two vertical rows of split logs, or large poles, or round stakes, are driven into the ground, and the spaces between them are filled in with dry grass. The tops

¹W. Jochelson, "The Koryak," *Memoirs of the American Museum of Natural History*, volume 10, part 2 (also known as Publications of the Jesup North Pacific Expedition, volume 6, part 2), pages 452-463.

of the eight outside corner poles (P) are notched, and into the notches wooden cross-beams are placed. Each pole holds the ends of two cross-beams. The upper ends of the inner vertical poles forming the walls are fitted into grooves in the cross-beams. In some houses, one row of the wall-boards, either the inner or the outer one, is set horizontally, and fits into grooves in the corner poles. When the vertical walls are thus prepared, they are covered to the top with earth taken from the hole (see fig. 61, s).

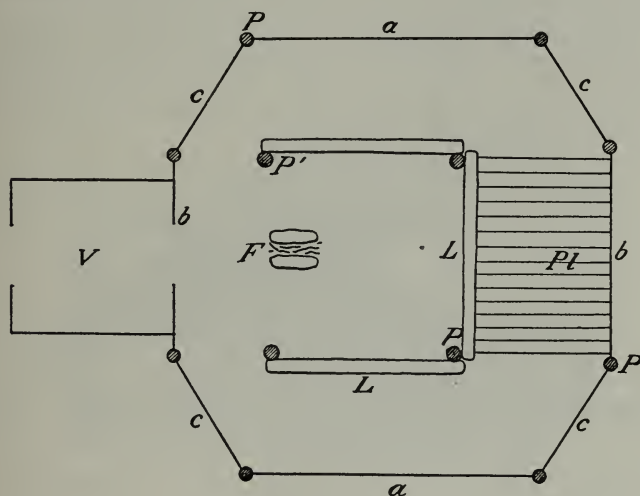


Fig. 60.

Four main posts (P') are driven into the ground in the middle space enclosed by the walls (figs. 60 and 61). These posts support the roof of the house, and form a square. In large houses the diameter of these posts is more than 30 cm., while their height is from 5 to 7 metres and over. Into the notches on the top of these posts two beams are placed, across the grooved ends of which two other cross-beams are fitted and lashed. These four cross-beams together form a square frame. One pair of such beams resting on the posts may be seen in figure 61. From these beams, slanting down to the top-beams of the walls a and b (figure 60), poles of poplar or aspen logs split in two are placed, thus forming four sides of the roof. The triangle between the cross-beams c and the inner posts P' (fig. 60) are covered with stakes of varying sizes, the lower ends of which rest on the beams c , and the upper ends on the extreme side-logs of the rectangular slopes.

All the crevices between the poles are carefully filled up with dry grass and loose earth, and on top is placed a row of cleft logs. In this manner the slanting roof of the house is formed. From each corner of the square

frame formed by the four main inner beams, two posts rise obliquely (see figures 61 and 62 *g*). Their lower grooved ends rest on the beams on each side of the corner posts. They diverge widely, and their upper sides rest on posts (*h*) which are grooved at the top for this purpose. These posts, called *tivo'-aiwgg.il*, are driven into the ground outside of the house. Logs (*d*) are placed on the poles *g* (see figures 61, 62). This structure consisting of three parts *g*, *h*, *d* (fig. 61), has the appearance of a funnel, or of an umbrella turned upside down, and placed over the square frame on top of the roof. This funnel is called, in the Koryak language, *ti'votil*, and is built for the purpose of protecting the upper entrance to the underground house from the drifting snow piled up by the raging winter storms. The snow driven by the gale from any point of the compass whatsoever strikes against the lower part of the funnel, and is scattered in all directions.

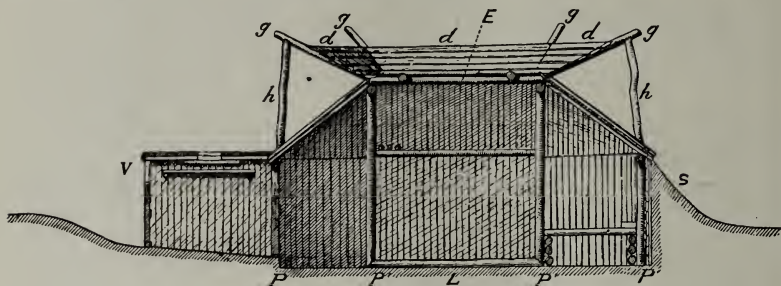


Fig. 61. Cross-section of underground house. (Koryak.)

Inside of the funnel is the square upper roof with the square winter entrance in the middle (see fig. 62). The upper roof (fig. 62, *l*) consists of logs covering the frame made of the four top beams, and forms the bottom of the walls of the funnel. In the middle of the roof a square well-shaped opening, each side of which is about one metre long, is made. This is the winter entrance (*cina' ugich'in*), through which, by descending a ladder (*yicig.it*), people enter the house (figs. 61, 62, *E*). This opening serves at the same time as a smoke-hole. The poles of the flat roof are double, like those of the slanting roof, and the open spaces and crevices between them are filled with dry grass and earth.

One side of the funnel, which is above the roof of the narrow passage serving as an entrance-room (fig. 62, *V*), is narrower and lower than the others. A ladder is placed against it for the purpose of getting up from the roof of the entrance-room to the upper roof of the house. The entrance-room is a narrow covered passage leading into the house. It is also excavated. Four short straight posts are driven into the ground, with stakes placed between them, forming two side-walls. A low door is made in the front wall. The

wall of the house serves as the rear wall of the ante-room. A small door is placed in that wall also. Both doors turn on wooden hinges. Cross-beams are placed upon the posts of the ante-room, and on top of them are horizontal poles forming the roof, which is covered with earth. The two side-walls of the entrance-room are covered outside with earth up to the top, so that the roof of the ante-room is accessible without a ladder. The height of the passage is hardly that of an average man. I had to stoop considerably to pass through the ante-room into the house. The door leading from outside into the entrance-room and that leading from the entrance-room into the house (see fig. 61), are each only a little over one metre in height, so that one has to stoop very much to enter the passage and the house.

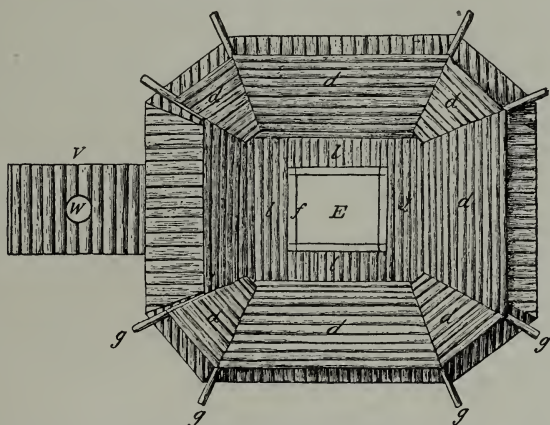


Fig. 62. Roof-plan of underground house. (Koryak.)

The dirt floor of the entrance-room slopes slightly down toward the door leading into the house. At the entrance from the ante-room into the house there is a threshold. The dirt floor of the house is on a somewhat lower level than that of the ante-room. The entrance-room, or passage, is called *ya'xel*.

The door leading from the entrance-room to the house is in use only during the fishing and sealing season—from the early part of May till the end of October. In October, when the skin boat is taken out of the water and put away for the winter, the entrance to the passage is closed up. It is first covered with grass, then earth is put over it, and pressed down with heavy logs. The custom of shutting off the door for the winter might be very simply explained as due to the wish to avoid the unpleasant necessity of constantly clearing the entrance from snow-drifts.

In the Kamenskoye settlement my wife and I occupied a small Russian log-cabin belonging to a Cossack who was absent at that time, and we had ample opportunity of experiencing the inconveniences of this type of dwelling

in that climate. Every wind, violent or not, would cover our house with snow to the top, and we were fastened in until my men (a Cossack and an interpreter), who slept in a neighboring Koryak house, came, together with Koryaks, and cleared away the snow from our door.

But the Koryak attach a religious importance to the custom of closing up the lower entrance during the winter. It is sinful, they say, to go into the house through that entrance in winter-time. However, none of the Koryaks were able to explain the meaning of this taboo, and but one offered a plausible explanation.

Just as the entrance to the tent of the Reindeer Koryak faces the side where the sun rises, so does the lower entrance to the house of the Maritime Koryak face the sea. In summer the door of the lower entrance is open in order to give free access to the sea-mammals, as though they were visitors; but, if, without any cause, the door should be left open in winter, when all hunting for sea-mammals is at an end, then the animals would avoid that house the next summer, and the occupants would be unsuccessful in their hunt. The lower doors of the houses which are occupied only during winter are, for the same reason, not opened at all.

When the lower door is walled up, a ladder is placed vertically on the floor of the house, rising toward the side *f* (fig. 62) of the entrance-place in the roof. The ladder is made from half of a split poplar-tree. On the side where it was cleft, that is, on the back of the ladder, the wood is hollowed out like a trough, that it may be easily grasped with the hands. Instead of steps, holes are cut through at distances of from 30 cm. to 40 cm. apart. These holes are like flattened disks in form. They are large enough for the small feet of the Koryak, particularly those of the women, and children's feet would enter up to the instep; but my feet, in shaggy winter stockings and boots, could hardly get through them. On ladders with small holes I had to get up by the tips of my toes only. Once, as I remember, the fur toe of my boot slipped off the step, and I should have fallen down into the house from a height of five metres, had I not clutched the ladder with my hands, and in this manner slid down. Once my Cossack, carrying in one hand a bowl of flour for dinner, was going down into the house. In changing the bowl from one hand to the other, he let go of the ladder, and, losing his balance, fell into the house flat on his back.

Occasionally a Koryak falls from the ladder; but as a rule they run up the ladder carrying heavy loads in one hand, their children on their backs, or with heavy buckets of water, or with pails filled with hot soup for the dogs. It is particularly interesting to see how skillfully they strike the holes, coming down without even looking at their feet. Children three and four years old climb up the ladder as quickly as squirrels, and slide down on their hands to save time. Such a way of sliding down is not quite safe, as I found out for myself. The ladder is planed smooth, so that the hands shall not get hurt by splinters. In course of time it becomes covered with a layer of fat mixed with soot, which makes it look as though it were covered with a dark, glossy varnish. The

edges are so slippery on this account that it is quite impossible to hold fast to the ladder with the hands, particularly if they are mittened. If one foot slips out of a hole before the other has had time to get into the next, a fall is likely to follow. In such case, one should by no means let go of the ladder, or he will surely land in the house on his back.

In houses occupied all the year round the ladder is removed in summer, and put away on the floor of the house, near the wall, until the next autumn. When the ladder is put up, it is anointed with fat, and charmed, in order that it may not admit any evil spirits into the house. As we have seen before, the ladder is one of the family guardians and its top is carved in the form of a human face. The top of the ladder rises about 1.3 metres above the opening, so that it can be grasped with the hands when one begins to descend. The ladder is fastened with thongs to the entrance-hole (fig. 62, *f*), lest it should shake or fall backward; and it is placed nearer to the left-hand corner, when facing the side *f*. This is done to prevent articles or heavy loads carried in the right hand from striking against the right side of the frame of the entrance-opening. The vertical position of the ladder is accounted for in the same way; namely, that buckets, loads, or children carried on the back may not strike the rear side of the frame of the opening. Very heavy or bulky articles are lifted up, or let down, into the house, by means of thongs.

The hearth usually consists of two oblong stones placed on the dirt floor at a distance of about 50 cm. from each other (see fig. 60, *F*). The fire is made of wood in the space between them. The hearth is about 50 cm. from the ladder, toward the entrance-room. Whether going in or out of the house, a person always faces the fire. The smoke escapes through the entrance-opening in the roof. Cinders and hot air also rise from the hearth, and escape along the ladder through the opening. The upper part of the ladder becomes so hot while there is a fire, that it burns the hands.

At first we had a very hard time getting down into the house while the fire was burning. As soon as we put our feet upon the ladder, the smoke blinded our eyes, and the heat nearly took away our breath; but after getting over the first trying moments, and as soon as we had descended a little, we felt relieved. The Koryak, however, do not experience any discomfort from having the opening serve the double purpose of a means of exit for people and of escape for smoke.

The arrangement for a draught is as follows. The door leading from the house to the entrance room, even in winter, is left open, for the entrance-room serves also as a cold-storage place. Seals killed late in fall are put away there, and also blubber, berries picked for winter use, frozen fish, and other provisions. Shelves (see fig. 61) are arranged there for this purpose. Owing to the exigencies of the climate, a part of the provisions has to be kept near at hand; for during violent winds it is difficult, especially for women, to get out to the storehouses, which are built on poles. A round opening sufficiently large for a man to get through is left on the roof of the entrance-room (see fig. 62, *W*).

This opening is called *na'uċñin*. Women and children often get in and out of the house through this opening, in order to avoid going up and down the ladder. The men consider it incompatible with their dignity to enter the house through this opening. In olden times, men "transformed" into women (*kavau*) used to go in and out through this opening. Provisions, dogs' harness, and other articles are lowered down through it. Besides, it serves as a draught-hole.

When the fire is not burning in the house, the entrance-room door is closed and the opening on its roof is stopped by a plug plaited of the stems of *Elymus mollis*. When the fire is started, the plug is removed from outside, placed upon the roof of the entrance-room, and the door leading from the latter into the house is opened. Thus a current of cold air forces the smoke upward into the roof-hole; but, since the opening is not directly over the hearth, the smoke strikes the ceiling, and spreads over the upper part of the house. When sitting on the floor, it is possible to remain in an atmosphere which is not charged with smoke. For instance, I could easily take notes when sitting on a log; but when I stood erect taking anthropometrical measurements, while the fire was burning, my eyes would begin to water. During very violent or irregular winds, a return-draught or a changing draught is formed, and the house becomes completely filled with smoke.

In the fall the Koryak chop driftwood into thin billets, and put them upon the roof around the funnel, except on that side by which the people ascend to the roof. This is done in order to have handy a supply of wood during severe snow-storms, which often rage for several days in succession, when it is utterly impossible to get out of the house. Of course, in good weather the supply of wood is sometimes renewed in winter. The wood is split into small bits to secure a fire quickly.

When the fire is first started and the entrance-room door is opened for the draught, the cold air strikes the feet, and the house is quite cold; but after the wood has burned out and the draught is shut off, the house begins to grow warm. It gets very warm when only red coals are left on the hearth and the smoke-opening is covered up. The temperature sometimes reaches 20 degrees Centigrade. When the entrance-opening is covered up, the heat remains for a considerable time. During the night the house gets very cold, and the temperature in the morning is often below zero. Thus the temperature drops between the times when the fire is made. To save fuel, the fire is not made often, only two or three times during the day. It is made invariably in the morning directly after getting up, and in the evening, before going to bed—at the time of the two main meals. During the day, fire is sometimes made in order to prepare tea, or if company should come.

The Maritime Koryak dwelling, compared with the tent of the Reindeer Koryak, provides the people with good shelter from frosts and winds. I think, therefore, that this type of Arctic dwelling is more ancient than the tent, which must have appeared in the far northeast of Asia together with the domesticated reindeer.

The cover used for shutting the roof-hole is made of boards tied to two cross-pieces by means of thongs drawn through holes. The cover is somewhat wider than the square opening of the entrance. A half-circular section is cut out at the side for the ladder to pass through, and thus the entire opening is covered up. During the day, however, the entrance is seldom closed, since people are constantly coming and going. In the evening, after all are in bed, the entrance is always covered up. The one who closes it gets up the ladder, and with his hands pushes out the cover from below over the opening. Of course, crevices enough remain for ventilation.

The cover of the entrance-opening also serves to regulate the draught while the fire is burning. It is placed vertically, near the entrance to face the wind, in order to prevent it from blowing into the entrance. The grass plug on the roof of the entrance-room is also utilized for regulating the draught. It is placed at the edge, in a direction opposite that of the wind, which, after striking against the plug, gets into the opening. Of course, all these arrangements are of no avail when strong winds are blowing.

The inner arrangement of the underground house is as follows. On the side opposite the door leading to the entrance-room, behind the posts, is a platform, from 30 cm. to 60 cm. high, made of boards (see figures 60 and 61). This place (*ayo'-ai*) serves as a seat and as a bedroom for visitors. It is covered with seal and reindeer skins. Upon it, near the walls, are stored away household articles that are in frequent use. The right and left sides of the house are called *yelñi-xal*. On the right side lives the master; on the left, his brothers, relatives, and neighbors. The places behind the posts are called *yoyo'ñi*. They serve for bedrooms, and have a dirt floor like the center of the house. These places are separated from the middle of the room by means of logs (fig. 60, *L*). The floor is strewn with willow-branches covered over with dry grass (grass mats are used in northern Kamchatka), and then with seal and reindeer skins. Sleeping tents are pitched over these skins.

These tents are of the same shape as the inner tents of the Reindeer Koryak, but, instead of being made of heavy reindeer-skins, they are made of old skins which have served for bedding before; or they are made of old fur clothing. The hair of the skins is closely clipped with a knife. These tents serve as bedrooms only, and are let down at night. In the daytime the front side of the tent is raised, and fastened on top with thongs. The children are kept on the skins under the raised tents, and the women also sit there with their work. The men sit, during the day, on logs in front of the tents, unless they are lounging in bed. They sleep in the tents with their heads toward the middle of the house. Bags filled with clothing, scraps of skin, nets, and other household articles, serve as pillows, while the bolster is supplied by the log.

To give better support to the main roof-beams in large houses, three additional posts are driven in between the central posts (fig. 61, *P*), except on the side opposite the door.

28. AMERICAN INDIAN BASKET WEAVES¹

By OTIS T. MASON

As you gaze on the Indian basket maker at work, herself frequently unkempt, her garments the coarsest, her house and surroundings suggestive of anything but beauty, you are amazed. You look about you, as in a cabinet

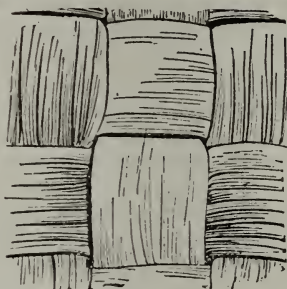


Fig. 1. Coarse checkerwork.

shop or atelier, for models, drawings, patterns, pretty bits of color effect. There are none. . . . Her tools are more disappointing still, for of these there are few—a rude knife, a pointed bone, that is all. Her modeling block is herself. Her plastic body is the repository of forms. Over her knee she molds depressions in her ware, and her lap is equal to all emergencies for convex effects. She herself is the Vishnu of her art, the creator of forms. . . .

In all types of weave the working strands are constantly dampened by dipping the fingers into a basket or cup of water close at hand, or, in the case of embroidery, by drawing the section of grass stem through the lips. . . .

The various processes of manufacture will now be definitely explained. In technic, basketry is either hand-woven or sewed. The hand-woven basketry is further divisible into (A) *Checkerwork*, (B) *Twilledwork*, (C) *Wickerwork*, (D) *Wrappedwork*, and (E) *Twinedwork*, in several varieties. The sewed work goes by the name of coiled basketry, and is classed both by the foundation and the fastening. In addition to these technical methods on the body, special ones are to be found in the border.

¹Selected from pages 221–258 of Otis T. Mason, "Aboriginal American Basketry," *U. S. National Museum Report for 1902*, pages 171–548, (1904).

WOVEN BASKETRY

A. *Checkerwork*.—This occurs especially in the bottoms of many North Pacific coast examples, and also in the work of eastern Canadian tribes (Fig. 1); in matting its use is well nigh universal.

In this ware the warp and the weft have the same thickness and pliability. It is impossible, therefore, in looking at the bottoms of the cedar-bark baskets and the matting of British Columbia (Fig. 2) or Eastern Canada to tell which is warp and which is weft. In very many examples the warp and weft of a checker bottom are turned up at right angles to form the warp of the sides,

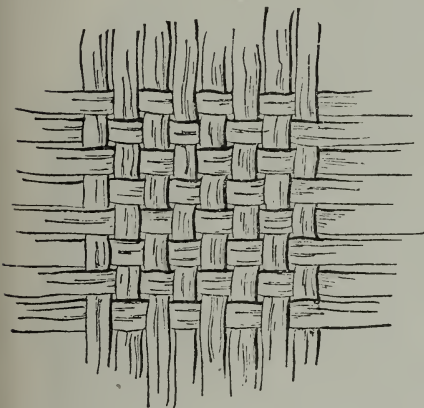


Fig. 2. Fine checkerwork.

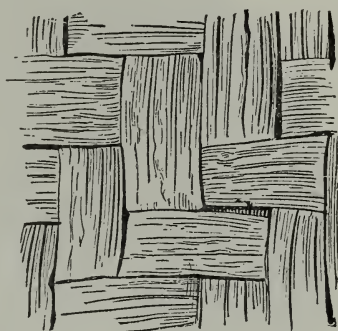


Fig. 3. Twilled work.

which may be wicker or twined work. . . . When warp and weft are fine yarn or threads the result is the simplest form of cloth in cotton, linen, piña fiber, or wool. The cheap fabrics of commerce are of this species of weaving. In art and industry lattice-work frequently shows the bars intertwined as in checker basketry. . . .

B. *Twilled work*.—This is seen especially in those parts of the world where cane abounds. In America it is quite common in British Columbia, Washington, Southern United States, Mexico, and Central America, and of excellent workmanship in Peru, Guiana, and Ecuador. The fundamental technic of diagonal basketry is in passing each element of the weft over two or more warp elements, thus producing either diagonal or twilled, or, in the best samples, an endless variety of diaper patterns. . . . (See Fig. 3).

Twill, or *tweel*. A diagonal appearance given to a fabric by causing the weft threads to pass over one warp thread, and then under two, and so on, instead of taking the warp threads in regular succession, on down, one up. The next weft thread takes a set oblique to the former, throwing up one of

the two deposited by the preceding. In some twills it is one in three, or one in four. The Latin *trilix*, a certain pattern in weaving, became *drillich* in German, and hence our word *drill*. *Twill* is derived from *zwillich*, which answers to the Latin *bilix*, and the Greek *dimitos*. The latter survives in *dimity*. See also *samite*, derived from Greek *hexamiton*, six thread.

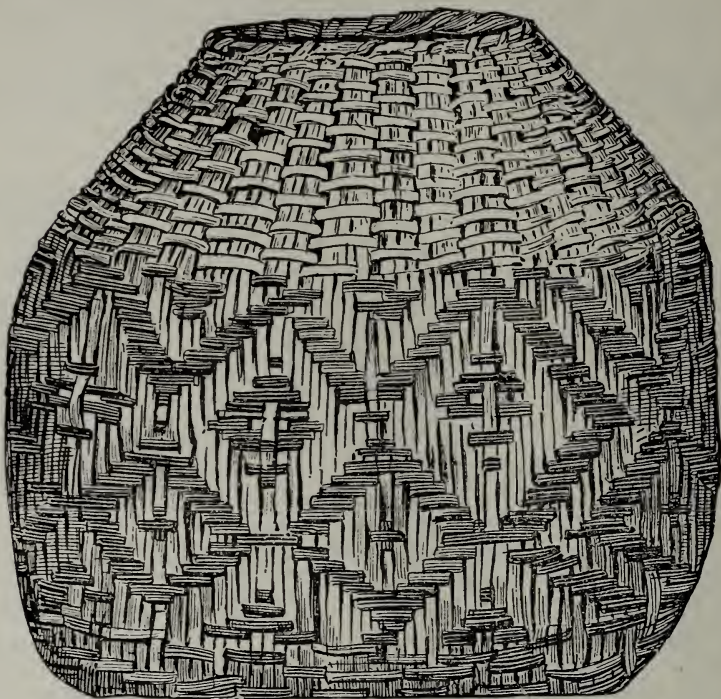


Fig. 4. Twilled weaving. Cherokee Indians, North Carolina.

The French *touaille* has also been suggested as the etymological source of the word.

The fabrics thus woven are very numerous—satin, blanket, merino, bombazine, kerseymere, etc. When the threads cross each alternately in regular order it is called *plain weaving*; but in *twill* the same thread of weft is *flushed*, or separated from the warp while passing over a number of warp threads, and then passes under a warp thread.

The points where the threads of the warp cross form diagonal lines, parallel to each other, across the face of the cloth. In *blanket twill* every third

thread is crossed. In some fabrics 4, 5, 6, 7, or 8 threads are crossed. In *full satin twill* there is an interval of 15 threads, the warp (*organzine silk*) being floated over 15 threads of the woof (*tram*), giving the glossy appearance. . . .

Excellent variety was also produced in this kind of weaving by means of color. Almost any textile plant when split has two colors, that of the outer,

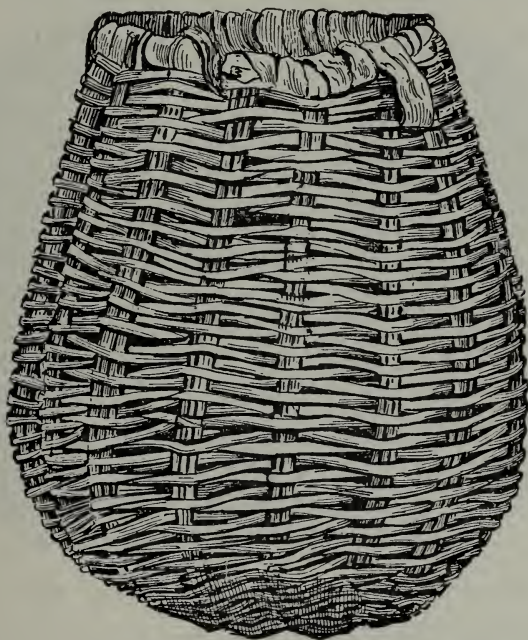


Fig. 5. Wicker basket. Zuñi, New Mexico.

or bark surface, and that of the interior woody surface or pith. Also the different plants used in diagonal basketry have great variety of color. By the skillful manipulation of the two sides of a splint, by using plants of different species, or with dyed elements, geometric patterns, frets, labyrinths, and other designs in straight line are possible. (See Fig. 4.). . . .

c. *Wickerwork*.—The name is from the Anglo-Saxon *wican*, to bend. Common in Eastern Canada, it is little known on the Pacific coast and in the Interior Basin, excepting in one or two pueblos, but is seen abundantly in Southern Mexico and Central America. It consists of a wide or a thick and inflexible warp and a slender flexible weft (Fig. 5.) The weaving is plain and

differs from checkerwork only in the fact that one of the elements is rigid. The effect on the surface is a series of ridges. It is possible also to produce diagonal effects in this type of weaving.

Wickerwork must have been a very early and primitive form of textile. Weirs for stopping fish are made of brush, and wattled fences for game drives are set up in the same manner. A great deal of the coarse basketry in use for packing and transporting is made in this fashion. The Zuñi Indians make

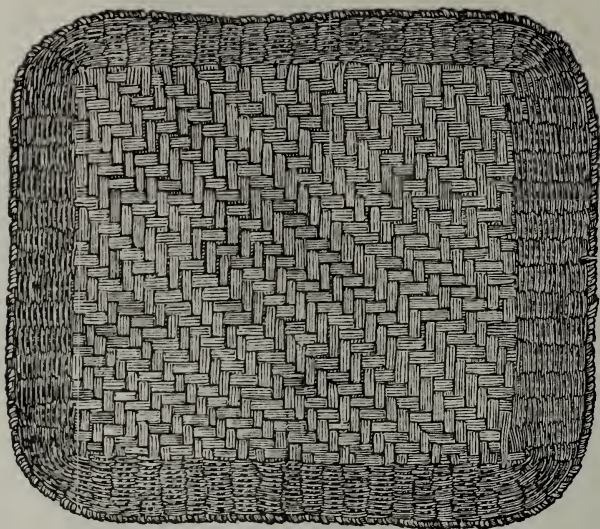


Fig. 6. Twilled and wicker mat. Hopi Indians, Arizona.

gathering baskets of little twigs after the same technic, the inflexible warp being made up of a small number of twigs of the same plant, laid side by side. The transition from checker to wicker in some examples is easy. The moment one element, either warp or weft, is a little more rigid than the other, the intersections would naturally assume a wicker form. . . .

Wickerwork has pleasing effects combined with diagonal and other work. Fig. 6 is a square Hopi plaque, having twilled weaving in the middle and a band of wicker outside of this, the whole finished with rough, coiled sewing on the border.

It has passed into modern industry through the cultivation of osiers, rattan, and such plants for market baskets, covers for grass bottles, and in ribbed cloth, wherein a flexible weft is worked on a rigid warp. Also, good examples are now produced by the Algonkin tribes of New England and Eastern Canada. . . .

D. *Wrappedwork*.—Wrapped basketry consists of flexible or rigid warp and flexible weft. Examples of this technic are to be seen in America at the present time among the Indians of Southern Arizona for their carrying frames. (See Fig. 7.)

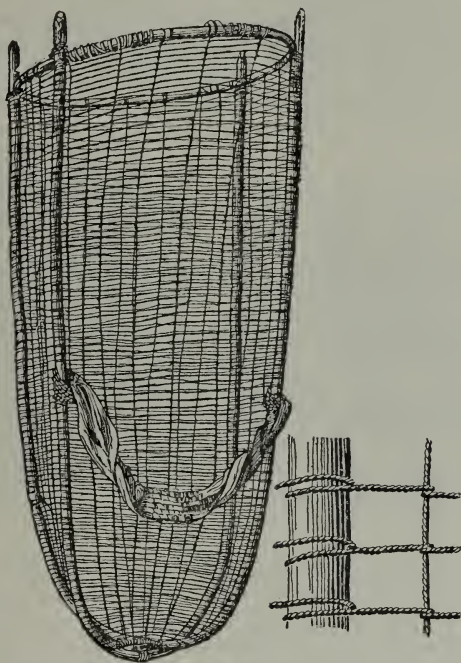


Fig. 7. Wrapped weaving. Mohave Indians, Arizona.

The warp extends from the rigid hoop, which forms the top, to the bottom where the elements are made fast. Firmness is given to the structure by means of two bowed rods crossing at right angles at the bottom and securely lashed at the top. The weft, usually of twine, is attached to one of the corner or frame pieces at the bottom and is wrapped once around each warp element. This process continues in a coil until the top of the basket is reached. In some of its features this method resembles coiled work, but as a regular warp is employed and no needle is used in the coiling, it belongs more to the woven series. Hudson mentions the same among the Pomos for holding roof poles in place. The wrapping is very close where the rafters come to a point. As they widen the weft comes to be farther apart, being quite open on the outer

margin. This method of weaving was employed by the Mound Builders of the Mississippi Valley. Markings of wrapped weaving pressed on ancient pottery taken from a mound in Ohio are to be seen in the Third Report of the Bureau of Ethnology. (See Fig. 8.)

This style of weaving had not a wide distribution in America and is used at the present day in a restricted region. When the warp and the weft are of the same twine or material and the decussations are drawn tight, the joint resembles the first half of a square knot. The Mincopies of the Andaman Islands construct a carrying basket in the same technic. Specimens of their

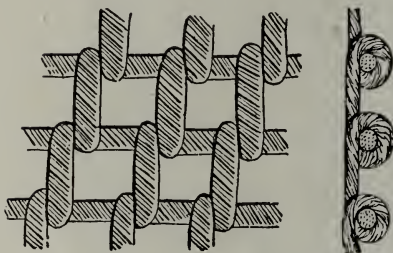


Fig. 8. Wrapped weaving, from mound in Ohio.

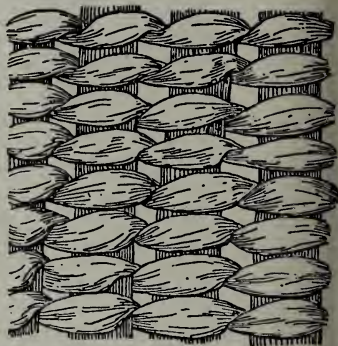


Fig. 9. Plain twined weaving.

work were collected and presented to the U. S. National Museum by Dr. W. L. Abbott. These baskets resemble most closely the Mohave specimens, only they are smaller and more attractive. The Mincopies and their neighbors far and near have the incomparable rattan for warp and weft, which combines the strength and flexibility of copper wire. The distribution of this wrapped weaving has not been studied. . . .

E. Twinedwork.—This is found in ancient mounds of the Mississippi Valley, in bagging of the Rocky Mountains, down the Pacific coast from the Island of Attu, the most westerly of the Aleutian chain, to the borders of Chile, and here and there in the Atlantic slope of South America. Indeed, it is found among savages throughout the world. It is the most elegant and intricate of all in the woven or plicated series. Twined work has a set of warp rods or rigid elements as in wickerwork, but the weft elements are commonly administered in pairs, though in three-strand twining and in braid twining three weft elements are employed. In passing from warp to warp these elements are twisted in half-turns on each other so as to form a two-strand or three-strand twine or braid and usually so deftly as to keep the smooth, glossy side of the weft outward. . . .

According to the relation of the weft elements to one another and to the warp, different structures in twined weaving result as follows:

1. Plain twined weaving over single warps.
2. Diagonal twined weaving or twill over two or more warps.
3. Wrapped twined weaving, or bird-cage twine, in which one weft element remains rigid and the other is wrapped about the crossings.
4. Lattice-twined weaving, tee or Hudson stitch, twined work around vertical warps crossed by horizontal warp element.
5. Three-strand twined weaving and braiding in several styles.



Fig. 10. Twined openwork.
Aleutian Islands.

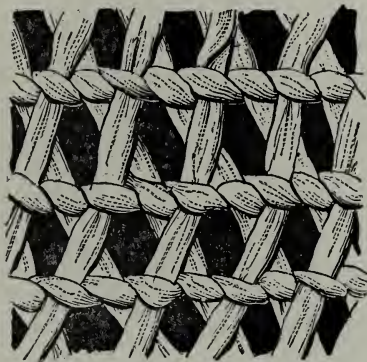


Fig. 11. Crossed warp, twined weave.
Makah Indians, Washington.

1. *Plain twined weaving*.—Plain twined weaving is a refined sort of wattling or crating. The ancient engineers, who built obstructions in streams to aid in catching or impounding fish, drove a row of sticks into the bottom of the stream, a few inches apart. Vines and brush were woven upon these upright sticks which served for a warp. In passing each stake the two vines or pieces of brush made a half turn on each other. This is a very primitive mode of weaving. Plain twined basketry is made on exactly the same plan. There is a set of warp elements which may be reeds, or splints, or string, arranged radially on the bottom and parallel on the body. The weft consists of two strips of root or other flexible material, and these are twisted as in forming a two-strand rope passing over a warp stem at each halfturn. (See Fig. 9.) Many wastebaskets are woven on this plan. . . .

In this connection must not be overlooked a variety of twined weaving in which the warp plays an important part. It is a transition between the plain twine and the next type, the halves of the double warp standing for the independent warp stems of the diagonal weave. If the weft be administered

in open work with the rows from a fourth to a half an inch apart and the warp elements be flexible under the strain of weaving, they will assume a zigzag shape.

Pleasing varieties of this type of twined weaving will be found in the Aleutian Islands. It resembles hemstitching. The Aleuts frequently use, for their warp, stems of wild rye or other grasses, in which the straws are split, or a pair used, and the two halves pass upward in zigzag form. Each half of a warp is caught alternately with the other half of the same straw and with a half of the adjoining straw, making a series of triangular instead of rectangular spaces. (See Fig. 10).

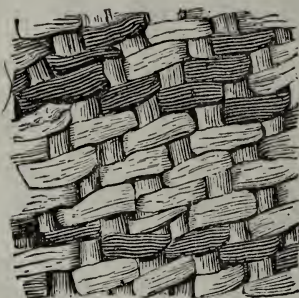


Fig. 12. Diagonal twined weaving.
Ute Indians, Utah.



Fig. 13. Diagonal twined basketry.
Pomo Indians, California.

A still further variation is given to plain twined ware by crossing the warps. In bamboo basketry of eastern Asia these crossed warps are also interlaced or held together by a horizontal strip of bamboo passing in and out in ordinary weaving. In such examples the interstices are triangular, but in the twined example here described the weaving passes across between the points where the warps intersect each other, leaving hexagonal interstices. (See Fig. 11.) This combination of plain twined weft and crossed warp has not a wide distribution in America, but examples are to be seen in southeastern Alaska and among relics found in Peruvian graves.

2. *Diagonal twined weaving.*—In diagonal twined weaving the twisting of the weft filaments is precisely the same as in plain twined weaving. The difference of the texture is caused by the manner in which the weft crosses the warps. This style abounds among the Ute Indians and the Apache, who dip the bottles made in this fashion into pitch and thus produce a water-tight vessel, the open meshes receiving the pitch more freely. The technic of the diagonal weaving consists in passing over two or more warp elements at each turn, just as in weaving with a single element. But the warp of the diagonal

twined weaving never passes over or under more than one weft as it does in twilled weaving. There must be an odd number of warps, for in the next round the same pairs are not included in the half turns. The ridges on the outside therefore, are not vertical as in plain weaving, but pass diagonally over the surface, hence the name. (See Figs. 12 and 13.) . .

3. *Wrapped twined weaving*.—In wrapped twined weaving one element of the twine passes along horizontally across the warp stems, usually on the inside of the basket, forming a lattice. The binding element of splint, or strip of bark, or string, is wrapped around the crossings of the horizontal element with the vertical warp. (See Fig. 14.)

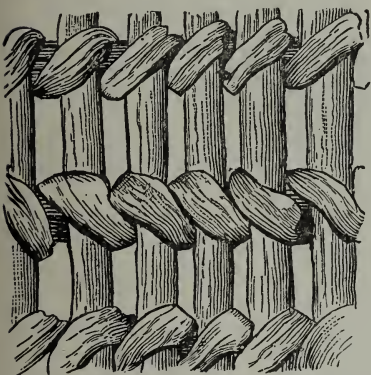


Fig. 14. Wrapped twined weaving.

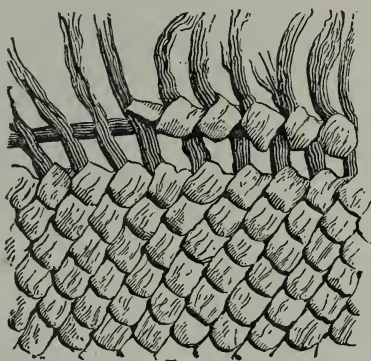


Fig. 15. Wrapped twined weaving.
Makah Indians, Washington.

On the outside of the basket the turns of the wrapping are oblique; on the inside they are vertical. It will be seen on examining this figure that one row inclines to the right, the one above it to the left, and so on alternately. This was occasioned by the weaver's passing from side to side of the square carrying basket, and not all the way round as usual. The work is similar to that in an old-fashioned bird cage, where the upright and horizontal wires are held in place by a wrapping of finer soft wire. The typical example of this wrapped or bird-cage twine is to be seen among the Makah Indians of the Wakashan family living about Neah Bay, Washington, and in the soft hats of Salish and Shahaptian. (See Fig. 15.)

In this type the warp and the horizontal strip behind the warp are both in soft material. The wrapping is done with a tough straw-colored grass. When the weaving is beaten home tight the surface is not unlike that of a fine tiled roof, the stitches overlying each other with perfect regularity. Such a simple style of fastening warp and weft together would seem to have occurred to

tribes of savages in many parts of the world. Strange to relate, however, excepting in Washington and the ocean side of Vancouver Island, the process is not known. The exception to this statement is to be found in a few sporadic cases where, perhaps, Nutka and Makah women had married into adjoining tribes. . . .

4. *Lattice-twined weaving*.—The lattice-twined weaving, so far as the collections of the National Museum show, is confined to the Pomo Indians, of the Kulanapan family, residing on Russian River, California. It is so called because it has a vertical and a horizontal warp resembling latticework. Dr. J. W. Hudson calls this technic tee. This is a short and convenient word, and

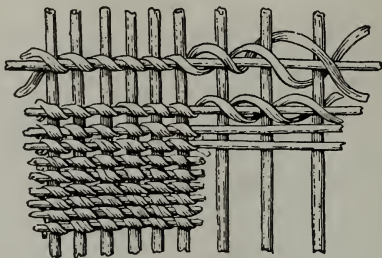


Fig. 16. Tee or lattice-twined weaving. Pomo Indians, California.

may be used for a specific name. The tee-twined weaving consists of four elements, (a) the upright warp of rods, (b) a horizontal warp crossing these at right angles, and (c, d) a regular plain-twined weaving of two elements, holding the warps firmly together. (See Fig. 16.)

In all these examples in the National Museum the horizontal or extra warp is on the exterior of the basket. On the outside the tee basket does not resemble the ordinary twined work but on the inside it is indistinguishable. Baskets made in this fashion are very rigid and strong, and frequently the hoppers of mills for grinding acorns, and also water-tight jars, are thus constructed. The ornamentation is confined to narrow bands, the artist being restricted by the technic. . . .

5. *Three-strand twined weaving*.—Three-strand twined weaving is the use of three weft splints and other kinds of weft elements instead of two, and there are four ways of administering the weft:

- (a) Three-strand twine.
- (b) Three-strand braid.
- (c) Three-strand, false embroidery, Tlinkit.
- (d) Wrapped twine, Thompson River.

It will be seen in studying these four methods that they are partly structural and partly ornamental, especially the last two. Inasmuch, however, as

the Indian woman makes her ornamental work a part of her industrial work, the four methods may be all studied here. Very little was known among the American aborigines concerning additional ornaments given to the textile after the foundation was woven. The part which furnishes strength to the fabric and that which gives decoration were in technic one and the same process.

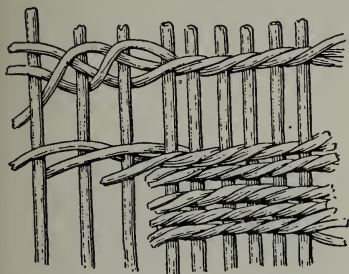


Fig. 17. Three-strand braid and twined work. (Outside.)

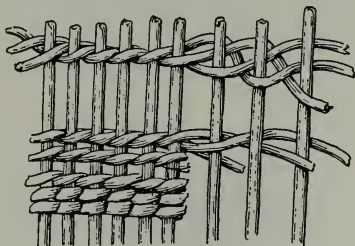


Fig. 18. Three-strand braid and twined work. (Inside.)

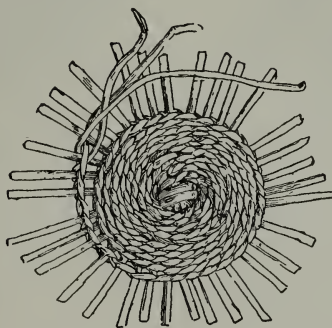


Fig. 19. Three-strand braid.

(a) *Three-strand twine*.—In this technic the basket-weaver holds in her hand three weft elements of any of the kinds mentioned. In twisting these three, each one of the strands, as it passes inward, is carried behind the warp stem adjoining, so that in a whole revolution the three weft elements have in turn passed behind three warp elements. After that the process is repeated. By referring to the lower halves of Figs. 17 and 18, the outside and the inside of this technic will be made plain. On the outside there is the appearance of a three-strand string laid along the warp stems, while on the inside the texture looks like a plain twined weaving. The reason for this is apparent, since in every third revolution one element passes behind the warp and two remain in front. Three-strand twined work is seldom used over the entire surface of a basket. . . .

(b) *Three-strand braid*.—In three-strand braid the weft elements are held in the hand in the same fashion, but instead of being twined simply they are plaited or braided, and as each element passes under one and over the other of the remaining two elements, it is carried behind a warp stem. This process is better understood by examining the upper part of Fig. 19. On the surface, when the work is driven home, it is impossible to discriminate between three-strand twine and three-strand braid. The three-strand braid is found at the starting of all Pomo twined baskets, no matter how the rest is built up. . . .

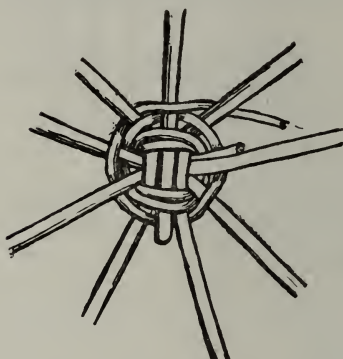


Fig. 20. Warp stems crossed in pairs.



Fig. 21. Warp stems crossed in fours.

Something should be said in this connection about the manner of laying the foundation for weaving baskets. In many of the specimens illustrated in this work it will be seen that very little tasteful care has been bestowed upon this part of the work. The Eskimos, for instance, do not know how, seemingly, but use a piece of rawhide, and it is said that the Indians of British Columbia formerly inserted a piece of board or wood at the bottom of their coiled baskets and sewed the coils around an edge of it, but there is method in much of the basket weaving in this point, as will be seen on examining the plates. Miss Mary White, in her book, *More Baskets and How to Make Them*, has worked this subject out very carefully.²

¶ Figs. 20 to 23, inclusive, show the result of her studies.

Fig. 20 is the simplest form of starting the bottom of a basket. Four warp stems are arranged in pairs and crossed at the center. A strip of wood or a flexible stem is wound twice around the intersection. The figure also shows how additional warp stems may be introduced into this pattern, being thrust between the regular stems. Once they are held firmly in place by two or three

²How to Make Baskets, New York, 1902, also *More Baskets and How to Make Them*, 1903.

rows of common basket weaving, additional warp stems are added, and they are bent out radially as a foundation for the work.

Fig. 21 shows how a start may be made with 16 warp stems crossing in groups of four at the center. Two sets begin at once to divide and radiate, and after they are held together by three rows of weft the other eight are spread out in the same way. The drawing illustrates exactly the manner in which this is done.

Fig. 22 shows another method of beginning with 16 warp stems, plaiting them into checker pattern at first, then afterwards spreading them out radially.

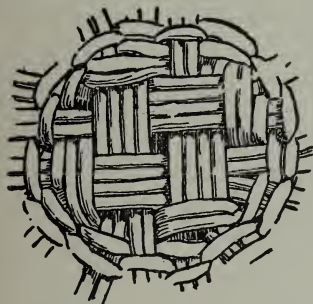


Fig. 22. Sixteen stems woven in fours.

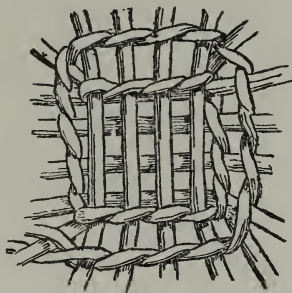


Fig. 23. Warp stems crossed in fours and twined.

Fig. 23 brings us into the Hopi Indian type of twined weaving. Here four stems in one direction cross the same number at right angles and are held in place by a row of twined weaving, additional warp stems being inserted at the corners, which spread out radially. . . .

COILED BASKETRY

Coiled basketry is produced by an over-and-over sewing with some kind of flexible material, each stitch interlocking with the one immediately underneath it. . . .

Coiled basketry in point of size presents the greatest extreme. There are specimens delicately made that will pass through a lady's finger ring, and others as large as a flour barrel; some specimens have stitching material one-half inch wide, as in the Pima granaries, and in others the root material is shredded so fine that nearly 100 stitches are made within an inch of space. In form the coiled ware may be perfectly flat, as in a table mat, or built up into the most exquisite jar shape. In design the upright stitches lend themselves to the greatest variety of intricate patterns.

Coiled basketry may be divided into ten varieties, based on structural characteristics.

The foundation of the coil may be (1) a single element, either splint, or stem, or rod; (2) a stem or other single element, with a thin welt laid on top of it; (3) two or more stems one over another; (4) two stems or other elements laid side by side, with or without a welt; (5) three stems in triangular position; (6) a bundle of splints or small stems; (7) a bundle of grass or small shreds.

The stitches pass around the foundation in progress (1) interlocking with and sometimes splitting stitches, but not inclosing the foundation underneath; (2) under one rod of the coil beneath, however many there may be; (3) under a welt of the coil beneath; (4) through splints or other foundation, in some cases systematically splitting the sewing material underneath. With these explanations it is possible to make the following ten varieties of coiled basketry, matting, or bagging:

- A. Coiled work without foundation.
- B. Simple interlocking coils.
- C. Single-rod foundation.
- D. Two-rod foundation.
- E. Rod and welt foundation.
- F. Two-rod and splint foundation.
- G. Three-rod foundation.
- H. Splint foundation.
- I. Grass-coil foundation.
- K. Fuegian coiled basketry.

These will now be taken up systematically and illustrated. (See Fig. 24.)

A. *Coiled work without foundation*.—Specimens of this class have been already mentioned. The sewing material is babiche or fine rawhide thong in the cold north, or string of some sort farther south. In the Mackenzie Basin will be found the former, and in the tropical and sub-tropical areas the latter. If a plain, spiral spring be coiled or hooked into one underneath, the simplest form of the open coiled work will result. An improvement of this is effected when the moving thread in passing upward after interlocking is twined one or more times about its standing part. (See Fig. 24A.). . . .

B. *Simple interlocking coils*.—Coiled work in which there may be any sort of foundation, but the stitches merely interlock without catching under the rods or splints or grass beneath. This form easily passes into those in which the stitch takes one or more elements of the foundation, but in a thorough ethnological study small differences cannot be overlooked. (See Fig. 24B.). . . .

C. *Single-rod foundation*.—In rattan basketry and Pacific coast ware, called by Dr. J. W. Hudson tsai in the Pomo language, the foundation is a single stem, uniform in diameter. The stitch passes around the stem in progress and is caught under the one of the preceding coil, as in Fig. 24C. In a collection of Siamese basketry in the U. S. National Museum the specimens are all made after this fashion. The foundation is the stem of the plant in its natural state; the sewing is with splints of the same material, having the glistening surface outward. As this is somewhat unyielding it is difficult to crowd the stitches together, and so the foundation is visible between. California is

not far behind the East in the quality of material, willow for the basis of the coil, and plants in a variety of colors for the sewing. The Siamese coiled basketry has little of design on its surface, but the American basketmaker may fix whatever her imagination may suggest. The effect of the plain stitching is pleasing to the eye by reason of the regular broken surface. In America single-rod basketry is widely spread. Along the Pacific coast it is found in northern Alaska and as far south as the borders of Mexico. The Pomo Indians use it in some of their finest work. The roots of plants and soft stems of willow,

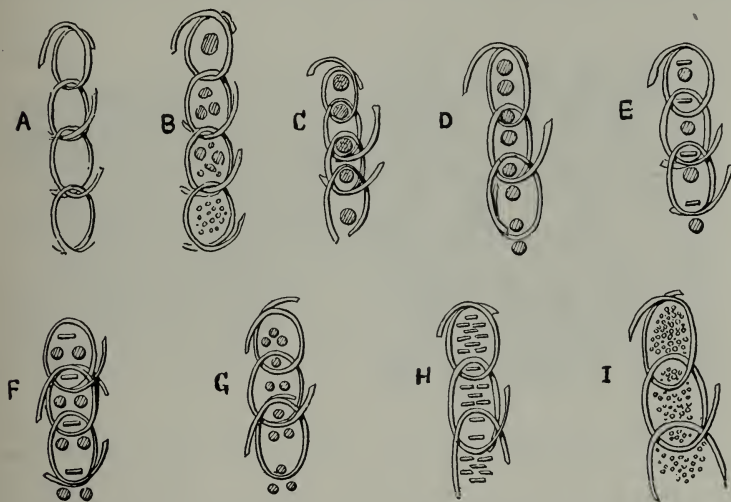


Fig. 24, A-I. Cross sections of varieties in coiled basketry.

thus, and the like are used for the sewing, and being soaked thoroughly, can be crowded together so as to entirely conceal the foundation. (See Fig. 25.). . .

D. *Two-rod foundation*.—One rod in this style lies on top of the other; the stitches pass over two rods in progress and under the upper one of the pair below, so that each stitch incloses three stems in a vertical series. A little attention given to Fig. 24D will demonstrate that the alternate rod, or the upper rod, in each pair will be inclosed in two series of stitches, while the other or lower rod will pass along freely in the middle of one series of stitches and show on the outer side. . . .³

F. *Two-rod and splint foundation*.—In this style the foundation is made thicker and stronger by laying two rods side by side and a splint or welt on

³The rod and welt foundation, which is illustrated in figure 24E, but whose description is not included here, passes easily into forms C, D, and F.

top to make the joint perfectly tight. The surface will be corrugated. Tribes practicing this style of coiling generally have fine material and some of the best ware is so made up. (See Fig. 24F.). . .

G. *Three-rod foundation*.—This is the type of foundation called by Carl Purdy bam shi bu, from bam, sticks, and sibbu, three. Among the Pomo and other tribes in the western part of the United States the most delicate pieces of basketry are in this style. Dr. Hudson calls them "the jewels of coiled basketry." The surfaces are beautifully corrugated, and patterns of the most intricate character can be wrought on them. The technic is as fol-



Fig. 25. Detail of single-rod coil in basketry.

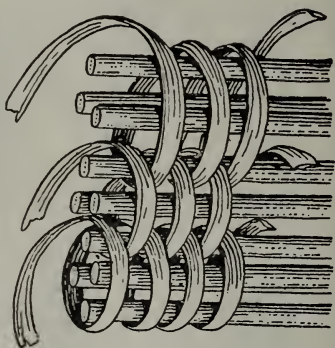


Fig. 26. Foundation for three rods, stitches catching rod underneath.

lows: Three or four small willow stems of uniform thickness serve for the foundation, as shown in Fig. 26; also in cross section in Fig. 24G. The sewing, which may be in splints of willow, black or white carex root, or cercis stem, passes around the three stems constituting the coil, under the upper one of the bundle below, the stitches interlocking. In some examples this upper rod is replaced by a thin strip of material serving for a welt (see Fig. 24F). In the California area the materials for basketry are of the finest quality. The willow stems and carex root are susceptible of division into delicate filaments. Sewing done with these is most compact, and when the stitches are pressed closely together the foundation does not appear. On the surface of the bam shi bu basketry the Pomo weaver adds pretty bits of bird feathers and delicate pieces of shell. The basket represents the wealth of the maker, and the gift of one of these to a friend is considered to be the highest compliment. . .

H. *Splint foundation*.—In basketry of this type the foundation consists of a number of longer or shorter splints massed together and sewed, the stitches passing under one or more of the splints in the coil beneath. In the Pomo language it is called chilo, but it has no standing in that tribe. In the Great

Interior Basin, where the pliant material of the California tribes is wanting, only the outer and younger portion of the stem will do for sewing. The interior parts in such examples are made up into the foundation. All such ware is crude, and the sewing frequently passes through instead of around the stitches below. In the Kílikitat basketry the pieces of spruce or cedar root not used for sewing material are also worked into the foundation. (See Fig. 24H).

In a small area on Fraser River, in southwestern Canada, on the upper waters of the Columbia, and in many Salishan tribes of northwestern Washington, basketry, called imbricated, is made. The foundation, as said, is in

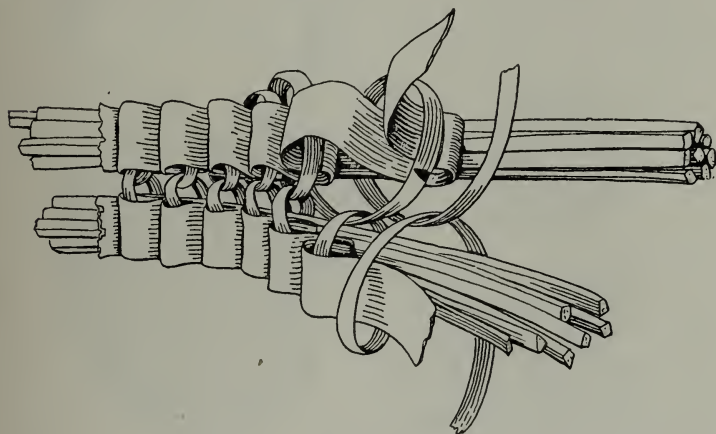


Fig. 27. Imbricated work detail, called Kílikitat. Showing method of concealing coil stitches.

cedar or spruce root, while the sewing is done with the outer and tough portion of the root; the stitches pass over the upper bundle of splints and are locked with those underneath. On the outside of these baskets is a form of technic, which also constitutes the ornamentation. It is not something added, or overlaid, or sewed on, but is a part of the texture effected in the progress of the manufacture. (See Fig. 27.)

The method of adding this ornamentation in strips of cherry bark, cedar bast, and grass stems, dyed with Oregon grape, is unique, and on this account I have applied the term "imbricated" to the style of weave here shown.

The strip of colored bark or grass is laid down and caught under a passing stitch; before another stitch is taken this one is bent forward to cover the last stitch, doubled on itself so as to be underneath the next stitch, and so with each one it is bent backward and forward so that the sewing is entirely concealed, forming a sort of "knifeplaiting." . . .

1. *Grass-coil foundation.*—The foundation is a bunch of grass or rush stems, or small midribs from palm leaves, or shredded yucca. The effect in all such

ware is good, for the reason that the maker has perfect control of her material. Excellent examples of this kind are to be seen in the southwestern portions of the United States, among the Pueblos and Missions, and in northern Africa. The sewing may be done with split stems of hard wood, willow, rhus, and the like, or, as in the case of the Mission baskets in southern California, of the

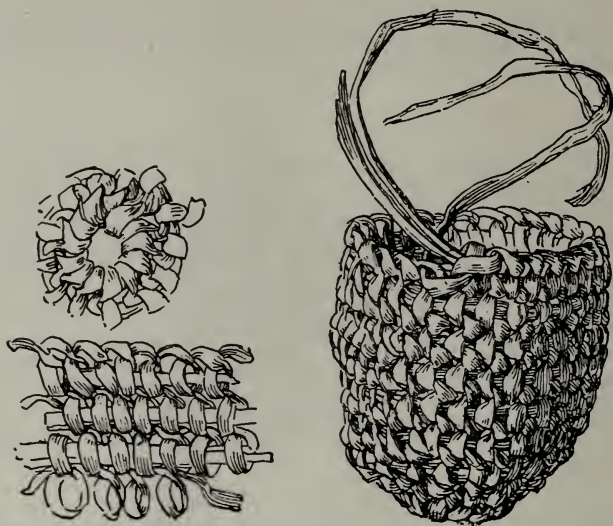


Fig. 28. Fuegian coiled basket, and details.

stems of rushes (*Juncus acutus*) or stiff grass (*Epicampes rigens*). (See the cross section given in Fig. 241.) In the larger granary baskets of the Southwest a bundle of straws furnishes the foundation, while the sewing is done with broad strips of tough bark. . . .

к. *Fuegian coiled basketry*.—In this ware the foundation is slight, consisting of one or more rushes; the sewing is in buttonhole stitch or half hitches, with rush stems interlocking. The resemblance of this to Asiatic types on the Pacific is most striking. (See Fig. 28.)

29. FLINT WORKING BY ISHI¹

By NELS C. NELSON

INTRODUCTORY

The very ancient art of producing implements from flint and allied stone substances by means of a fracturing process, though practised almost the world over, seems to have reached a really high state of perfection in only three localities, namely, Egypt, Denmark with adjoining parts of Scandinavia, and the Pacific coast of the United States. To be sure, choice bits of workmanship are to be found elsewhere, as for example in France and in Mexico, but these appear to be exceptions rather than the rule.

Just why these seemingly sporadic occurrences of excelling technique should be localized as they are is an interesting question because the manual dexterity implied might with reason have been looked for elsewhere, unless we at once yield the point that such dexterity is not a gift peculiar to any branch of mankind or, in other words, that the human factor is not the only factor concerned. For the present therefore the archaeologist in attempting to explain these isolated appearances of highly cultivated flint technique can do little more than suggest that they were conditioned to some extent at least by two interdependent factors, the first being the presence of unlimited amounts of raw material and the other a grand scale of manufacture. The larger the output and the larger the number of artisans at work the greater the possibility of an expert—an artist—whose technique, once perfected, stood some chance of being copied and handed down.

If the archaeologist is asked about the elements of the technique itself he is somewhat better informed. It is true he cannot state precisely how the exquisite knife-blades of early predynastic Egypt or the shapely daggers of Scandinavia were produced, but the methods involved in the making of a "Stockton curve" or any other delicately worked object to be found in the Pacific states is fairly well known. Methods of flint chipping have been observed and recorded in many places, especially in America, from the days of John Smith and Torquemada down to Catlin, Schumacher, and still others of recent date. In addition to these observations and based partly on them there has been done an immense amount of study and experimental work. A glance at the *Handbook of American Indians* under "Stonework" shows what interest the subject has aroused during the last four or five decades. Tech-

¹Originally printed in the *Holmes Anniversary Volume*, Washington, 1916, pages 397-402.

nology would seem to have been a favorite study, and no one has contributed more to the subject than Professor Holmes. The various processes of pecking, grinding, drilling, flaking, and chipping have all been more or less successfully duplicated. Perhaps none have become expert at flint chipping, for that we know, from the experience of the professional flint workers, requires time; but the arrowpoints, etc., scattered over the face of the earth are no longer mysterious darts from heaven. The art of producing them is well understood.

This being so, it may seem superfluous to record yet another observation on flint chipping. Nevertheless, without citing possible arguments in defense, I venture to describe once more the essential processes and also at the same time to call attention to the fact that a native Indian flint worker is living at present under conditions where he can be observed at work by anyone who will pay him a visit.²

ISHI AND HIS WORK

During the early part of 1912, while connected with the University of California Museum at the Affiliated Colleges in San Francisco, I had opportunity to observe and in a measure to direct the activities of Ishi, the lately rescued survivor of the Yahi or Southern Yana Indians. Among other things suggested to him, partly to satisfy the interest of the visiting public, was that of chipping arrowpoints, and probably nothing else that he undertook proved of equal interest and satisfaction to visitors as well as to himself. He still keeps up the work and is not at all averse to having it inspected. Whether or not Ishi is an artist might be a matter for debate, but no one will deny that he is an experienced workman. This conclusion is based partly on a comparison of his productions with the best to be found in California and also on what the English flint workers at Brandon tell us as to the time normally required to master the art.

Unfortunately, what might perhaps be considered strictly scientific procedure was sacrificed at the beginning. In the first place, no considerable amount of raw obsidian being at hand, bits of heavy plate-glass were furnished, and Ishi, finding this substance somewhat less refractory than obsidian and much more easily worked than chalcedony, agate, and the like, soon offered mild objections to using any medium except glass. This does not mean, however, that he could not be prevailed upon to work obsidian and other rocks. In the second place, Ishi, whether as a result of outside suggestions or his own intelligence I do not recall, found tools made of iron preferable to the old-fashioned implements of Indian manufacture. But while these facts might be urged as objections to the genuineness of his art, it still remains a fact that Ishi's method is his own and was mastered by him years before, probably with tools of the same general size and shape, if not actually of iron.

²This was the case at the time these lines were written, but Ishi died in March, 1916.

That iron tools are the best, considered from the point of view of the finished product made with them, is very doubtful; it is so hard and unyielding in comparison with bone or antler as to tend to bruise the edge of the obsidian; but, on the other hand, it keeps the point better and in that way saves time. With these facts in mind let us briefly consider what actually takes place when Ishi goes to work.

THE TOOLS EMPLOYED

Given a nodule of flint or a lump of obsidian, Ishi, in making a notched arrowpoint, let us say, employs three distinct processes, for each of which special tools ordinarily are required. The first process involves the division or breaking up of the obsidian mass to obtain suitable thin and straight flakes; the second process consists in chipping the selected flake to the size and shape of the arrowpoint desired; and the third and final process embodies, among other things, the notching of the base of the point to facilitate its attachment to the arrowshaft.

For the first process, that of dividing the obsidian mass, an ordinary hard, water-worn boulder may do, especially if only small flakes are wanted, the obsidian being broken up or a flake struck from it by a direct blow. But if a large spearpoint or knife-blade is ultimately desired, an intermediate tool is needed. This is apparently (Ishi never made one for me to see) a short, stout, blunt-pointed piece of bone or wood serving as a sort of punch and sometimes as a lever. As a matter of fact, what is wanted in the case of producing a large implement is not the division of the obsidian mass but the trimming down of this mass by the detachment from it of all unnecessary portions. A direct blow with a hammerstone might be fatal to the obsidian core being thus shaped, while an indirect blow, delivered through this punch, the same being held at a selected spot and angle, has some chance of success in removing the superfluous portions without shattering the whole piece to bits. A hammerstone then, or a hammerstone together with a punch, are the tools required for the preliminary rough work, namely, the production of flakes or of a flaked core.

For the secondary flaking or, as it will be termed in this paper, *chipping*, a tool was made as follows: Ishi on one occasion took a common spike and at another time a piece of iron rod about the size of a lead pencil. He ground one end down about equally on two opposing sides, making a curving, chisel-like cutting edge, lenticular in cross-section—a tool of a nature half-way between an awl and a chisel. Around the butt-end a bit of cloth was wrapped to ease the handhold, and the chipping tool was finished. The notching tool was practically a duplicate of the preceding, but much smaller. A slender nail was sharpened as before and, being too small to be held in the hand as it was, the butt-end was inserted into an improvised wooden handle. The whole tool was nothing more nor less than a common awl.

Another necessary item was a piece of leather or hide with which to protect the hand holding the obsidian during the chipping and notching processes.

Five things therefore seem to constitute the full complement of tools and accessories used in making the average chipped artifact. But more or fewer tools may no doubt be employed under extreme conditions.

METHODS OF WORK

Preliminary Flaking.—Unfortunately, while Ishi went through the motions of this process a number of times for me, I never photographed it, wishing first to be convinced of its feasibilities. But for reasons which I did not comprehend at the time, Ishi always refused to execute the process. Professor Kroeber has since been partly successful with him, and from his report I judge that Ishi's reluctance was due in all probability to the element of danger involved. Thus it appears that the first time Ishi was induced to try flake production he was cut about the face by flying bits of the glass-like substance and bled profusely. Quite naturally therefore the accompanying illustration of the act (plate I, *a*), furnished by Professor Kroeber, shows Ishi with his eyes closed. This photograph, it should be explained, is not a mere pose; it is a selected view of the workman in action and as such tells a better story than words could do. Ishi holds a water-worn boulder in the right hand and a lump of obsidian in the left, and is attempting to break up the latter or to dislodge flakes from it by means of repeated direct blows. From among the resulting fragments he will pick out those most readily adapted to the purpose needed, let us say arrowpoints, and proceed at once to shape them.

Secondary Flaking or Chipping.—Having selected a suitable flake, Ishi assumes the new pose shown in plate I, *b*, also kindly furnished by Professor Kroeber. The actual disposition of flake and tool is better indicated in the detail views of plate II. The flake to be worked will be observed resting on a bit of leather and placed transversely across the proximal fleshy part of the left palm and there held by one or more of the finger-tips. The chipping tool, grasped firmly with the right hand, is placed on the upper side of the flake, very close to the edge, and by a quick, downward pressure a chip is removed from the under-side of the flake. That much of this seemingly simple act will be noticed by any casual observer, but it may be well to analyze the act a little so as to show that it is after all not so simple as it looks. There is, so to speak, some knack about it. First of all we may note the fact, well shown in the illustration, that the axis of the tool used and the edge of the obsidian to be worked do not meet at a right angle, although they are in nearly the same plane. Secondly, and this does not show well in the illustration, the chipping tool is so turned on its axis that the plane of its cutting edge meets the plane of the flake to be worked at nearly, if not quite, a right angle. That this turn of the chipping tool is necessary or at least deliberate is certain because Ishi employs it invariably in the later stages of the chipping process, but not at all regularly



PLATE I.

- a. The primary process—dislodging flakes from a piece of obsidian by means of a boulder.
- b. The secondary process—chipping the obsidian.

STONE WORKING BY ISHI.



PLATE II.
MODE OF USING THE FLAKING IMPLEMENT BY ISHI.

in the early stages. Not having experimented very much, I am unable to say why Ishi proceeds as he does, but he gets results which I cannot imitate, try as I will. Ishi removes thin and fairly slender chips that extend two thirds or more across the face of the flake, while my chips are thick and short. Consequently his arrowpoints when finished are thin and shapely, while mine, much to his disgust, are thick and clumsy affairs. My work resembles the abrupt Mousterian retouch, while Ishi's is the true Solutrian technique.

As to the actual movements involved in chipping, these would be rather difficult to describe. The pressure exerted, if not too great, comes mostly from a wrist action; but if greater weight is needed the leverage is thrown back to the elbow and shoulder. The precision of the movement in the later and more delicate stage of the work is guided by placing the index finger of the tool against the edge of the palm on which the flake lies. The pressure is down, of course, rather than up, mainly in order to avoid the flying chips, and the chips being left in the palm of the hand absolutely necessitates the leather pad. Ishi works rapidly, reversing the flake often or not as conditions require. He begins chipping at the point on the flake nearest the tool and gradually works toward the farther end, and his best work appears to be done when he is chipping in a direction from the point end of the arrowpoint toward the base rather than when, on reversal, he must work in the opposite direction, i. e., from the base of the arrowpoint toward the point. Working in this manner Ishi can finish an arrowpoint of average size in half an hour, more or less, according to the nature of the substance he is working and also according to the adaptability of the flake originally selected. Having finished he proceeds to the final step.

Notching and Serrating.—First of all, Ishi takes his leather pad, doubles it over the end of his left thumb, and ties it in place with a string. Then he grips the arrowpoint near the base, holding it firmly between the end of the protected thumb and adjoining index finger. With the right hand he directs the point of the notching tool against the edge of the arrowpoint at the place where the notch is to be, and by a slight pressure removes a small chip. The tool is held perpendicular to the plane of the arrowpoint and is pushed forward as if to be driven into the end of the thumb. For each minute chip thus removed the arrowpoint is reversed until the notch is of the depth desired. The successful act requires some deftness, or the stem is sure to be severed from the blade of the arrowpoint. Ishi seldom fails, however, especially when working with glass, and he completes the two notches often in about half a minute's time. If the edge of the arrowpoint was to be serrated, Ishi would doubtless proceed in the same way, although I never asked him to try.

30. COSTUMES OF THE PLAINS INDIANS¹

By CLARK WISSLER

MEN'S GARMENTS

If one take a typical man's shirt of the Plains area and suspend it, the sleeve and shoulder line will be found horizontal and to coincide. In other words there is a neck hole, but no collar. If on the other hand, one suspend a true coat, the familiar European sleeve and shoulder cut is seen. This may be generalized by classing the former as of the poncho type and the latter as of the coat type.

First, we may note the structure of the poncho type. Fig. 4² represents a specimen collected about 1838. There is another old specimen in the Nez Percé collection. A more modern specimen is shown in Fig. 2. A simpler but old and interesting specimen is Fig. 3.² From these sketches the general pattern concept is clear. Two whole skins of mountain sheep or other ruminants are taken and cut as in Fig. 5. Thus, the peculiar contour of sleeve extensions, or capes, is explained as also that of the skirt (Fig. 6). The whole pattern of this type of shirt is seen to be correlated with the contour of the natural material, and it seems most probable that it was this form of the material that suggested the pattern.

The former distribution of this type of shirt cannot be precisely stated, but so far we have found it to prevail among the Dakota, Nez Percé, Gros Ventre, Blackfoot, Crow, Hidatsa-Mandan, Pawnee, Assiniboin, Arapaho, Ute, Comanche, Kiowa, and Cheyenne. It occurs, but less universally among the Sarsi, Plains-Cree, and Ojibway on the north and on the south among the Apache and in the pueblo of Taos.

Our museum collection contains about forty shirts of this poncho type, all of which we have examined in detail. Among them we find many minor variations in pattern, but so far as we can see these are all adjustments to the coat type and to new materials and, hence, due to white contact. The tendency to use cow skins and cloth is very strong and in these materials the natural contour, the base of the pattern, is wanting. This is particularly noticeable in the cut of the bottom as shown in Fig. 7. In most cases this curve is simplified by dropping the tail projection in the center, observable in the older type, Fig. 7b, but in one Arapaho piece we find an interesting rectangular cut at the corresponding point, Fig. 7e.

¹From *Anthropological Papers of the American Museum of Natural History*, volume 17, part 2, 1915.

²Omitted.

A comparison of the tops of these sketches shows that the shoulder extensions tend to become true sleeves and the sides of the shirt are often entirely or partially sewn up in which case a vertical cut is made on the breast at the neck without which it would be next to impossible to get into the garment. The older ponchos have neither fronts nor backs, both sides being alike, but



Fig. 2. A Dakota shirt. For pattern see Fig. 7b.

many of the modern variants have a distinct front. It is chiefly these variations in association with slight inessential modifications calling to mind features of European shirts that suggest that we have in Figs. 7a and 7b the original type of poncho for men in the Plains area.

This is further reinforced by a study of sleeve forms which in the older skin specimens follow the pattern of Figs. 7a and 7c. The [square] sleeve pattern is found most often in cloth and distinctly modern skin pieces.

So far we have concerned ourselves with the pattern alone, but the most characteristic features of these ponchos are decorative. In all specimens of

the older type these take approximately the same forms. The most conspicuous of these features are the broad beaded or quilled bands. These are made on separate strips of skin and readily detached from the shirt. From each side of the neck a band runs along the shoulder seam almost to the ends of the sleeves. At right angles to this so as to fall over the shoulders like suspenders are two other bands, one for each side. At the neck, both front and back, are triangular flaps also bearing beaded and quilled decorations.

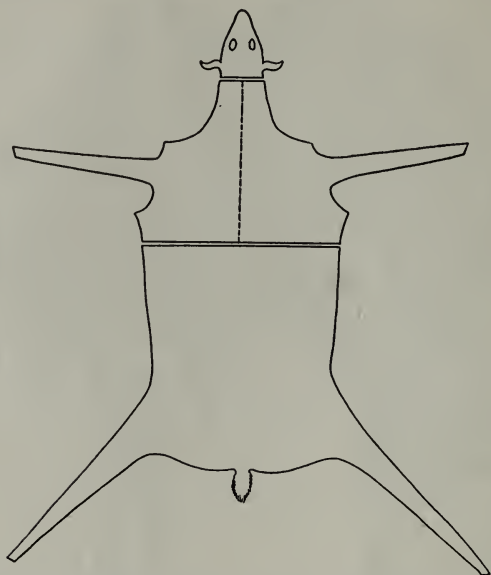


Fig. 5. Diagram showing how a skin is cut and folded to make a shirt of the poncho type.

The edges of these bands are often strung with rows of feathers, strips of white weasel skins or human hair. It is due to the latter than these ponchos are often called "scalp-shirts." In the older types particularly, the edges of the body and sleeves were notched and fringed. These characteristics were almost universal but there are in addition, tribal and regional decorations. Thus, many Blackfoot ponchos bear large circular designs on the breast and back. According to Maximilian, this was formerly common among the Assiniboin and a few other northern tribes. Dakota ponchos in particular, are frequently painted in two ground colors, bearing heraldic devices. The beaded or quilled bands have tribal peculiarities also. In another paper of this series we shall consider the probable origins of these various decorations.

Returning to the coat-like features of the more modern forms of poncho, we may be reminded that the coat form is not necessarily of European origin. The Eskimo and most Déné tribes cut a coat-like garment that fits the neck and shoulders and has sleeves, but the best known and most distinctly coat-like form is that of the Naskapi. Here the pattern is most clearly cut to fit the human form as in European tailoring. With slight variations this pattern extends through the Cree to the Rocky Mountains and thence to the Salish of British Columbia. It even dips into the Plains as shown in the old Gros Ventre specimen.

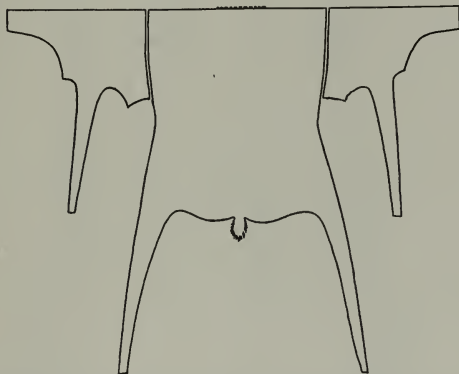


Fig. 6. Diagram showing the arrangement of pieces cut from the preceding.

The garments of the western Déné area are not very well known, but in Alaska some of the modern natives wear a coat with flaring skirts like the Naskapi and certain Siberian styles. It is therefore probable that the Naskapi form is aboriginal and not due to European influence. . . .

WOMEN'S GARMENTS

The costume for women is in its fundamental technique similar to that for men. Taking a Crow specimen as the type (Fig. 16) we see that three pieces of skin are used: an inserted yoke and two large pieces for the skirt. The sides are sewed up from the bottom of the skirt almost to the cape-like extension at the shoulders. There are no sleeves, but the cape-like shoulder piece falls down loosely over the arms. The side seams and the bottom and all outer edges are fringed. The garment has neither front nor back, both sides being the same.

The technical concept is again a garment made from two whole skins, in this case, elkskins. A dress is formed by placing two whole skins face to

face, the tail ends at the top, the head at the bottom. The neck is fitted and the yoke formed by the insertion of a transverse piece of skin. Very little trimming is needed to shape the sides of the skirt.

The distribution of this pattern concept so far as we were able to determine by the study of specimens is: Arapaho, Assiniboin, Apache, Blackfoot, Crow, Cheyenne, Comanche, Dakota, Gros Ventre, Hidatsa, Kiowa, Nez Percé, Northern Shoshoni, Plains-Cree, Sarsi, Ute, Yakima.

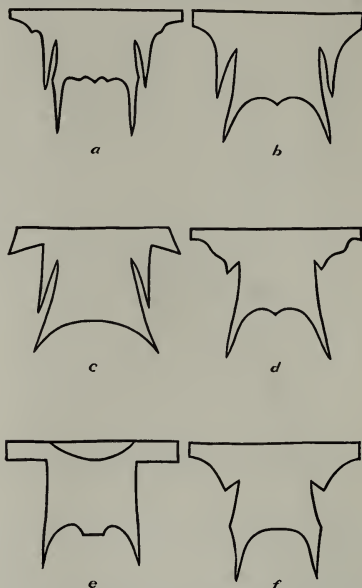


Fig. 7. Shirt Patterns for Men: *a* Nez Percé; *b* Dakota; *c* Dakota; *d* Nez Percé; *e* Arapaho; *f* Crow.

We come now to the consideration of variations in the pattern. While the fundamental form holds throughout the above distribution, there are a number of distinct cuts for the contour of the yoke and the bottom of the skirt. Yet, there is very little variation within the tribe, it is truly surprising how precisely each of the tribes we have studied followed a definite form for the bottoms of their dresses, making it clear that they had a fixed mode, or style for the cut. This will be more fully discussed in another connection.

European trade brought within the reach of these tribes the finest of cloth. A special quality known as strouding was always popular and from the very first was substituted for skins in making garments. This new material had a shape of its own and consequently presented a new problem to the Plains

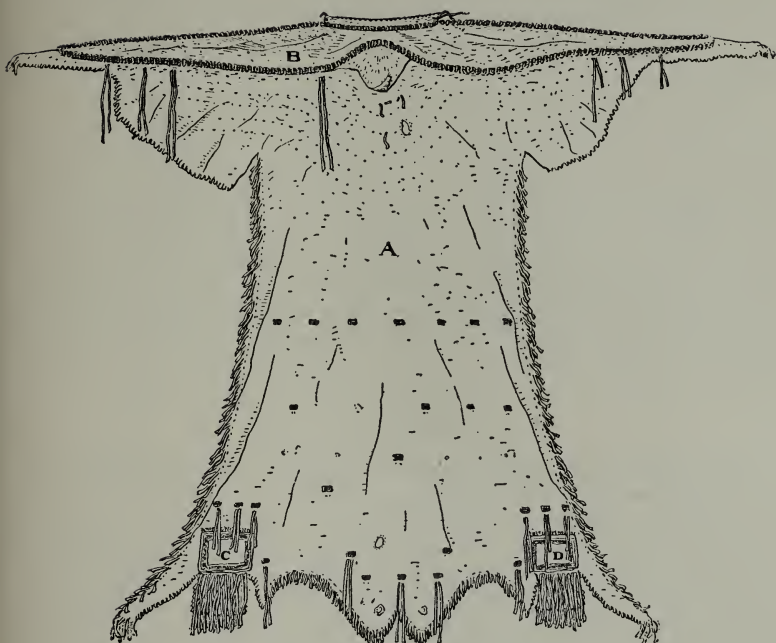


Fig. 16. A Woman's dress, Crow. An entire elk skin is taken for each side. A cape-like yoke is formed of two pieces as above, and sewed in place. The tail projection on *b* hangs loosely over a corresponding one on *a*.

dressmaker. One example is shown in Fig. 21³. A more common way was to take a rectangular piece of cloth, cut a neck hole in the middle, join the sides by triangular inserts and add shoulder extensions. In many cases the bottom of the skirt is cut out to conform to the old style. Thus it is clear that the original two skin concept was able to prevail over the introduction of new materials.

When we turn to ornamentation we find these dresses quite decorative. In contrast to men's ponchos, we find the tail of the elk falling in the center of the breast, but like them in the tendency toward horizontal decorations with quills and beads. While there is considerable tribal variation in decoration, the general tendency is to bead or quill more or less completely the entire yoke. The edges of the yoke and the skirt are usually fringed and sometimes the latter faced with a narrow band of beads. Upon the body of the skirt will be found a varying number of pendant thongs. Among the Blackfoot symbolic devices of red cloth are often found near the bottom of the skirt and similar attachments are noted on some Sarsi, Crow, and Assiniboin dresses. . . .

SUMMARY

Some of the points of general significance developed in the preceding discussion may be formulated as follows:

1. We have satisfactory proof that the characteristic style of garments for both men and women in the Plains area, was suggested by the natural contour of the materials used, or rather resulted from an economic use of the same. It is also shown how quickly the features determined by the shape of the original materials disappeared when trade cloth came into use, though the fundamental pattern remains the same, indicating that this pattern or general concept was one of structure rather than of adapted material. This leads one to suspect that the pattern concept came first to a skin-using people from some external source, most likely from the textile ponchos of the south.

2. The concept of tailoring, or cutting a garment to follow the lines of the shoulder and trunk is found in America only among the coat-wearing tribes: viz., the Eskimo, a few northern Algonkin, and the Déné, with minor representation among the Iroquois and interior Salish. Our data show how the idea tends to spread by increasing contact with Europeans. In the Old World tailoring appears again among the more primitive peoples of the north, but in historic peoples first among the Chinese. Its appearance in Western Europe is relatively recent. The idea of tailoring cloth seems not to have been developed by people anywhere except in Central Asia. It seems probable that the extensive use of the toga-like garment and the rectangular poncho, especially the latter, was due to the limitations of the weaving process and that here again the unavoidable rectangular contour of textiles is responsible

³Omitted.

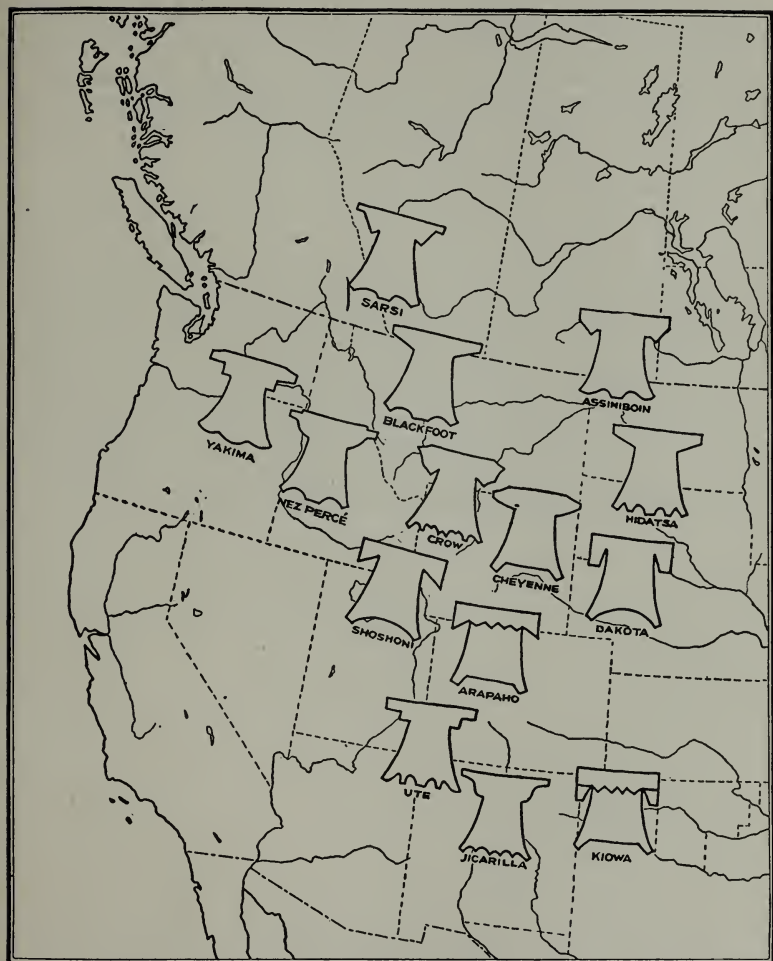


Fig. 27. Distribution of the Plains type of Woman's dress.

for the fundamental similarities of styles. The Chinese on the other hand, escaped from these limitations by the development of tailoring. This presents another important problem: viz., did some of the northern tribes invent tailoring out of the necessity of the case or borrow it from some more highly cultured people in Central Asia? One may suspect that the Chinese were the borrowers, but in the absence of investigation this should be given little weight. In any case in the New World we find these two contrasting types of garment structure, tailoring prevailing in the far north and the opposite in the remainder of the continent, including the area of specialized textiles. . . .

5. Finally we have found in this material trait a good case of culture diffusion. That the secondary features such as cut of skirt-bottoms, sleeves, etc., when found to be the same for two or more tribes are so because of tribal independence in invention, is scarcely admissible because of the observed geographical continuity. A random repetition of specific inventions should also have a random distribution to be consistent with the laws of accident. Likewise the fundamental structural concept which underlies these secondary concepts while very widely distributed is also continuous, whence it follows that the diffusion hypothesis is the most acceptable. We do find one disconnected locality for the two-skin concept among the Iroquois; but since these people were great travelers and had other costume concepts in general use, we may hesitate to credit them with its independent invention.

31. ON A METHOD OF INVESTIGATING THE DEVELOPMENT OF
INSTITUTIONS; APPLIED TO LAWS OF MARRIAGE
AND DESCENT¹

By E. B. TYLOR

For years past it has become evident that the great need of anthropology is that its method should be strengthened and systematized. The world has not been unjust to the growing science, far from it. Wherever anthropologists have been able to show definite evidence and inference, for instance, in the development series of arts in the Pitt-Rivers Museum, at Oxford, not only specialists but the educated world generally are ready to receive the results and assimilate them into public opinion. Strict method has, however, as yet only been introduced over part of the anthropological field. There has still to be overcome a certain not unkindly hesitancy on the part of men engaged in the precise operations of mathematics, physics, chemistry, biology, to admit that the problems of anthropology are amenable to scientific treatment. It is my aim to show that the development of institutions may be investigated on a basis of tabulation and classification. For this end I have taken up a subject of the utmost real as well as theoretical interest, the formation of laws of marriage and descent, as to which during many years I have been collecting the evidence found among between three and four hundred peoples, ranging from insignificant savage hordes to great cultured nations. The particular rules have been scheduled out into tables, so as to ascertain what may be called the "adhesions" of each custom, showing which peoples have the same custom, and what other customs accompany it or lie apart from it. From the recurrence or absence of these customs it will be our business to infer their dependence on causes acting over the whole range of mankind.

Years since, long before my collection of data approached its present bulk, and could be classified into the elaborate tables now presented, I became naturally anxious to know whether the labor had been thrown away, or whether this social arithmetic would do something to disclose the course of social history. The question was how to make the trial. I remembered a story I had once heard of Horace Vernet, that a friend asked him how he planned out his huge battle-pieces. The painter took the inquirer into his studio and began a picture for him by first touching in a bayonet in one corner of his can-

¹Journal of the [Royal] Anthropological Institute [of Great Britain and Ireland], volume 18, pages 245-269, 1889.

vas, then drawing the arm and sabre of the trooper slashing over the bayonet-thrust, and so on from one overlapping figure to the next till he reached the central group. It seemed to me that it would be well to begin thus in one corner of the field. The point I chose was a quaint and somewhat comic custom as to the barbaric etiquette between husbands and their wives' relatives, and vice versâ: they may not look at one another, much less speak, and they even avoid mentioning one another's names. Thus, in America, John Tanner, the adopted Ojibwa, described his being taken by a friendly Assineboin into his lodge, and seeing how at his companion's entry the old father- and mother-in-law covered up their heads in their blankets till their son-in-law got into the compartment reserved for him, where his wife brought him his food. So in Australia, Mr. Howitt relates how he inadvertently told a native to call his mother-in-law, who was passing at some little distance; but the black fellow sent the order round by a third party, saying reproachfully to Mr. Howitt, "You know I could not speak to that old woman." Absurd as this custom may appear to Europeans, it is not the outcome of mere local fancy, as appears on reckoning up the peoples practising it in various regions of the world, who are found to be about sixty-six in number, that is, more than one-sixth of the whole number of peoples catalogued, which is roughly three hundred and fifty. Thus:

AVOIDANCE

Between H. and W.'s Rel.	Mutual	Between W. and H.'s Rel.
45	8	13

Now, on looking out from the schedules the adhesions of this avoidance-custom, a relation appears between it and the customs of the world as to residence after marriage. This is seen in the following computation of the peoples whose habit is for the husband to take up his abode with the wife's family permanently, or to do so temporarily and eventually to remove with her to his own family or home (the reverse of this does not occur), or for the husband at once to take home the wife.

RESIDENCE

H. to W.	Removal	W. to H.
65	76	141

Now, if the customs of residence and the customs of avoidance were independent, or nearly so, we should expect to find their coincidence following the ordinary law of chance distribution. In the tribes where the husband permanently lives with his wife's family (sixty-five out of three hundred and fifty), we should estimate that ceremonial avoidance between him and them might appear in nine cases, whereas it actually appears in fourteen cases. On the other hand, peoples where the husband at marriage takes his wife to his home (one hundred and forty-one out of three hundred and fifty), would

rateably correspond with avoidance between him and her family in eighteen cases, whereas it actually appears in nine cases only. Also, if the thirteen cases of avoidance between the wife and the husband's family were divided rateably among the different modes of residence, two or three cases should come among the peoples where the husband lives with the wife's family, but there are no such cases. On the other hand, five cases should be found among the peoples where the wife lives in the husband's home or family, but actually there are eight. Thus there is a well marked preponderance indicating that ceremonial avoidance by the husband of the wife's family is in some way connected with his living with them; and vice versa as to the wife and the husband's family. Hereupon, it has to be enquired whether the facts suggest a reason for this connection. Such a reason readily presents itself, inasmuch as the ceremony of not speaking to and pretending not to see some well-known person close by, is familiar enough to ourselves in the social rite which we call "cutting." This, indeed, with us implies aversion, and the implication comes out even more strongly in objection to utter the name ("we never mention her," as the song has it). It is different, however, in the barbaric custom we are considering, for here the husband is none the less on friendly terms with his wife's people because they may not take any notice of one another. In fact, the explanation of this ceremonial cutting may be simpler and more direct than in civilized Europe. As the husband has intruded himself among a family which is not his own, and into a house where he has no right, it seems not difficult to understand their marking the difference between him and themselves by treating him formally as a stranger. So like is the working of the human mind in all stages of civilization, that our own language conveys in a familiar idiom the same train of thought; in describing the already mentioned case of the Assineboin marrying and taking up his abode with his wife's parents who pretend not to see him when he comes in, we have only to say that they do not recognize him, and we shall have condensed the whole proceeding into a single word. In this first example, it is to be noticed that the argument of a causal connection of some kind between two groups of phenomena brings into view, so far at least as the data proved sound, a scientific fact. But we pass on to less solid ground in assigning for this connection a reason which may be only analogous to the real reason, or only indirectly corresponding with it, or only partly expressing it, as its correlation with other connections may eventually show. This important reservation, once stated, may be taken as understood through the rest of the enquiry.

Let us now turn to another custom, not less quaint-seeming than the last to the European mind. This is the practice of naming the parent from the child. When Moffat, the missionary, was in Africa among the Bechuana, he was spoken to and of, according to native usage, as Ra-Mary—father of Mary. On the other side of the world, among the Kasias of India, Colonel Yule mentions the like rule; for instance, there being a boy named Bobon, his father was known as Pabobon. In fact there are above thirty peoples spread

over the earth who thus name the father, and, though less often, the mother. They may be called, coining a name for them, teknonymous peoples. When beginning to notice the wide distribution of this custom of teknonymy, and setting myself to reckon its adhesions, I confess to have been fairly taken by surprise to find it lying in close connection with the custom of the husband's residence in the wife's family, the two coinciding twenty-two times, where accident might fairly have given eleven. It proved to be still more closely attached to the practice of ceremonial avoidance by the husband of the wife's relatives, occurring fourteen times, where accident might have given four. The combination is shown on the diagram, fig. 1, the (approximate) numbers on which give the means of estimating the probable closeness of causal connection. Were the three customs so distantly connected as to be practically independent, the product of the corresponding fractions $132 \times 53 \times 31 \div 350 \times 350 \times 350$ multiplied into the three hundred and fifty peoples would show that their concurrence might be expected to happen between once and twice in the list of peoples of the world. In fact it is found eleven times. Thus, we have their common causation vouched for by the heavy odds of six to one. Many of the firmest beliefs of mankind rest, I fear, on a less solid basis. In tracing out the origin of the group of customs in conformity with these conditions, it is not necessary to invent a hypothesis, as an account of the proceedings of the Cree Indians will serve as a "luminous instance" to clear up the whole situation. Among these Indians the young husband, coming to live with his wife's parents, must turn his back on them, not speaking to them (especially not to his mother-in-law), being thus treated as a stranger till his first child is born; whereupon he takes its name, and is called "father of So-and-so," and thenceforth attaches himself to his parents-in-law rather than to his own parents. That is to say, he is ceremonially treated as a stranger till his child, being born a member of the family, gives him a status as father of a member of the family, whereupon they consistently leave off the farce of not recognizing him. When I brought this argument to the knowledge of Dr. G. A. Wilken, of Leyden, he pointed out to me that in his series of papers on "Primitive Forms of Marriage," where he gives instances of the naming of fathers from children, he had stated this practice to be an assertion of paternity. Undoubtedly it is so on the father's part, and its being so is quite compatible with its being a recognition of him by the wife's kinsfolk, the two aspects belonging to one social fact.

Taking the connection between residence and ceremonial avoidance to be substantiated by their relative adhesions, it is necessary to notice that there are cases where the husband, although he carried the wife away from the home of her parents, nevertheless goes through the form of avoiding them. This, under the circumstances, seems a motiveless proceeding, but is intelligible as a survival from a time when he would have lived with them. These cases belong mainly to the Malay District and to Australia. In the Malay district the habit of residence in the wife's family is still a notable institution of the

country, though being fast superseded by householding on the Arab and European models. In Australia, the native custom is described as being that the husband takes his wife to his own home, while at the same time he carries out the etiquette of cutting his mother-in-law to a ludicrous extreme, with slight traces of the avoidance of the father-in-law. It appeared to me that on the present explanation this must indicate a recent habit of residence on the wife's side, and reference showed a law of the Kurnai tribe of Gippsland, that when a native kills game, certain parts of the meat (of a kangaru, the head, neck, and part of the back) are the allotted share of the wife's parents.

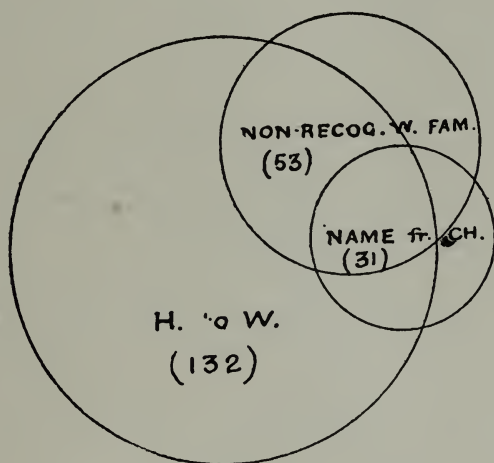


Fig. 1

As the duty of supplying game to the wife's household when the husband lives there is one of the best-marked points of matriarchal law, I wrote to Mr. Howitt, as the leading authority on Australian anthropology, suggesting that further enquiry would probably disclose evidence hitherto unnoticed as to the maternal stage of society subsisting in Australia. After examination made, Mr. Howitt replied: "I am now satisfied that your surmises are quite correct," and therewith he sent details bearing on the question, especially an account by Mr. Aldridge, of Maryborough, Queensland, as to the practice of the tribes in his neighborhood. This I will quote, as being a strongly marked case of residence on the wife's side. "When a man marries a woman from a distant locality, he goes to her triblet and identifies himself with her people. This is a rule with very few exceptions. Of course, I speak of them as they were in their wild state. He becomes part of and one of the family. In the event of a war expedition, the daughter's husband acts as a blood-relation, and will

fight and kill his own blood-relations if blows are struck by his wife's relations. I have seen a father and son fighting under these circumstances, and the son would most certainly have killed his father if others had not interfered."

The relative positions of the two groups of customs, residence and avoidance, may now be more completely shown, by the aid of the diagram, fig. 2.

Here the space representing residence is divided into three sections, viz., residence on the wife's side; the transitional stage of removal (where the couple began married life in the wife's house, but eventually move); residence on the husband's side. According to the previous arguments, the ceremonial avoidance between the husband and the wife's family is taken to have arisen within the periods when he and they lived permanently or temporarily in contact, and to have continued by survival into the period after this co-residence had ceased. There next appear the small group of eight cases of mutual avoidance, at once between the husband and the wife's family, and the wife and the husband's family. These consistently are found in the removal stage, where both kinds of residence meet, surviving into the stage of residence on the husband's side. Avoidance between the wife and the husband's family has the same range, but here the conditions producing it belong to both stages of residence, and there is no question of survival.

From this distribution of the avoidance-customs, it appears that in the parts of the world open to the present inspection, the three stages of residence have tended to succeed one another in the upward order of the diagram. Residence on the wife's side appears earliest, after this the removal stage, and latest, residence on the husband's side. For if it be supposed that the course of society was in the reverse direction, as would be represented by turning the diagram upside down, avoidance between the husband and the wife's family would be represented as arising in the stage when the husband lived away from it, while avoidance between the wife and the husband's family, which ought on this supposition to continue by survival into the stage of residence on the wife's side, is not found there. The avoidance-customs, though practically so trifling, are thus signals showing the direction of a movement, of which we shall more fully see the importance, namely, the shifting of habitual residence from the wife's family to the husband's.

Let us now proceed to apply a similar method to the investigation of the great division of society into matriarchal and patriarchal. In the matriarchal system, descent in the family or clan is reckoned from the mother; authority is mainly on her side, the mother's brother being habitually guardian of the children; succession to rank and office, and inheritance of property, follow the same line passing to the brother or to the sister's son. In the patriarchal system descent is from the father; he has the power over wife and children; succession and inheritance are from him to his offspring. Between these extreme stages lies an intermediate or transitional stage in which their characteristics are variously combined. The terms patriarchal and matriarchal not being quite appropriate, I shall use in preference for the three stages the

terms maternal, maternal-paternal, and paternal. The classification is necessarily somewhat vague, but I think will be found to have sufficient precision for the problem of determining the direction in which mankind had tended to move from one of the stages to another. In dealing with this problem certain customs relating to marriage law will be used as indicators.

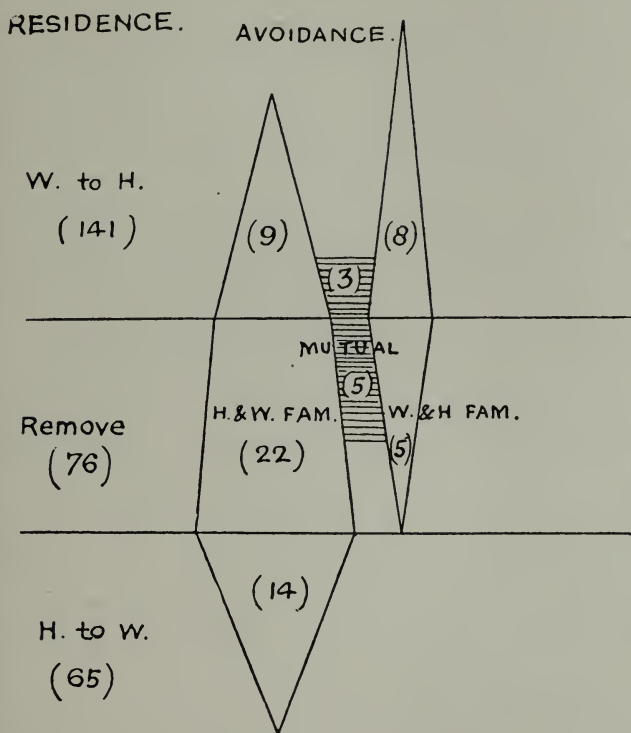


Fig. 2

Among a large proportion of the nations of the world up to the middle levels of culture, the remarriage of widows is arranged, and more or less enforced, but the regulations are framed on two distinct principles. On the first principle the widow becomes the wife of her husband's brother, or near kinsman, according to some recognized order of precedence of claim. The word "levirate," from levir—husband's brother, has become the accepted term for this institution, but its sense must in most cases be extended to take in a series of kinsmen, among whom the brother-in-law only ranks first. Un-

fortunately, it has seldom been thought worth while to ascertain this precise order, which might throw light on family structure, as in an account drawn up by Mr. Howitt of the practice in Australian tribes where any man is eligible to succeed to the widow, if he stands in the relation of elder or younger brother to the deceased, beginning with actual brothers on the male or female side, according to the rule of descent in the tribe, and extending to tribal brothers who are in our terminology cousins, more or less near. The levirate appears in its various forms among one hundred and twenty peoples in my list, or about one in three in the world. On taking out its adhesions it seems sufficiently accounted for as a custom of substitution, belonging to the period when marriage is a compact not so much between two individuals as between two families, often made when the couple are infants unable to understand it, in fact sometimes before their birth. That the levirate forms part of this family transaction is consistent with other customs more or less associated with it, viz., that when a wife dies or turns out ill her family are bound to replace her by another, a rule which even sometimes holds for betrothal, and that the widow is not allowed to marry out of her husband's family unless by leave of his kinsmen, who have the choice of keeping her, or parting with her, usually for a price. The social distribution of the levirate is shown in Fig. 3 to extend through all three social stages. It is in the maternal-paternal stage that it comes into competition with the second principle, unknown in the maternal stage, in which the father's widows pass by inheritance to his sons, especially the eldest son taking his stepmothers. A small but important group of cases forms a bridge between the two principles of levirate and filial succession, combining both in the same nation. This combination is well shown in Africa, where on a chief's death the head wife will pass by levirate to his brother, while her son, the new chief, will inherit a crowd of stepmothers, a less onerous legacy indeed than may seem, as they are practically slaves who hoe and grind corn for their own living. Looking at the distribution of these groups of customs, it is seen to be only compatible with the view that the paternal rule followed the maternal, bringing with it even while its prevalence was but partial, the principle of paternal widow-inheritance.

The quaint custom of the *couvade* has now to be considered from the same point of view. In this the father, on the birth of his child, makes a ceremonial pretense of being the mother, being nursed and taken care of, and performing other rites such as fasting and abstaining from certain kinds of food or occupation lest the new-born should suffer thereby. This custom is known in the four quarters of the globe. How sincerely it is still accepted appears in a story of Mr. Im Thurn, who on a forest journey in British Guiana notices that one of his Indians refused to help to haul the canoes, and on inquiry found that the man's objection was that a child must have been born to him at home about this time, and he must not exert himself so as to hurt the infant. In the Mediterranean district it is not only mentioned by ancient writers, but in Spain and France, in or near the Basque country, it went on into modern

times; Zamacola, in 1818, mentions, as but a little time ago, that the mother used to get up and the father take the child to bed. Knowing the tenacity of these customs, I should not be surprised if traces of couvade might be found in that district still. Now examining the distribution of the couvade by the

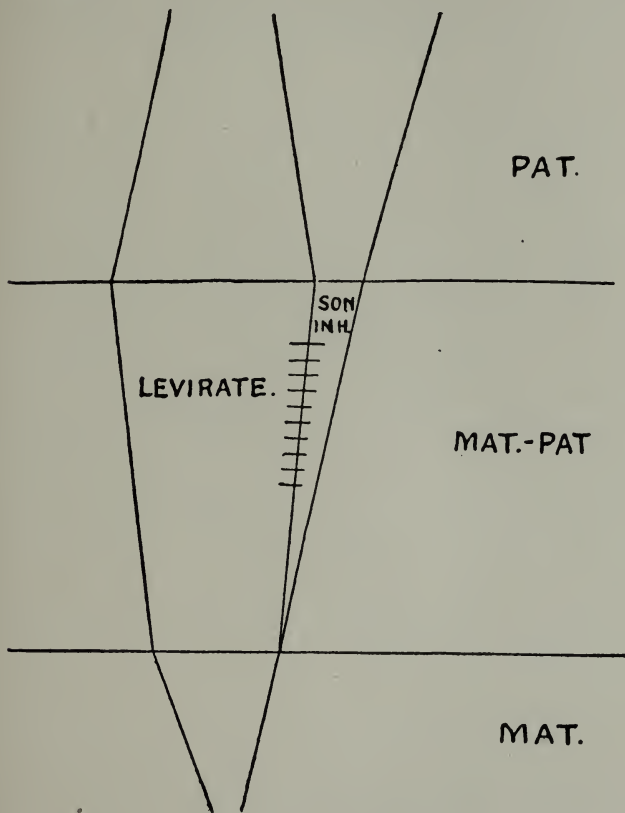


Fig. 3

diagram, fig. 4, we see that this farcical proceeding does not appear in the maternal stage, but arising in the maternal-paternal, at once takes its strongest development of twenty cases; in the paternal the number falls to eight cases, leading to the inference that there it is only kept up in dwindling survival.

Looking at this position, I must now argue that the original interpretation of the couvade given by Bachofen in his great treatise in 1861, and supported by Giraud-Teulon, fits substantially with the facts, and is justified by them.

He takes it to belong to the turning point of society when the tie of parentage, till then recognized in maternity, was extended to take in paternity, this being done by the fiction of representing the father as a second mother. He compares the couvade with the symbolic pretenses of birth which in the classical world were performed as rites of adoption. To his significant examples may be added the fact that among certain tribes the couvade is the legal form by which the father recognizes a child as his. Thus this apparently absurd custom, which for twenty centuries has been the laughing-stock of mankind, proves to be not merely incidentally an indicator of the tendency of society from maternal to paternal, but the very sign and record of the vast change.

The distribution of customs in figs. 3 and 4 is only compatible with a tendency of society to pass from the maternal to the paternal systems, the maternal being placed as earliest from the absence of survivals from other stages extending into it, as they freely do into the paternal, which is therefore placed as latest. The argument is a geological one. Just as the forms of life, and even the actual fossils of the Carboniferous formation, may be traced on into the Permian, but Permian types and fossils are absent from the Carboniferous strata formed before they came into existence, so here widow-inheritance and couvade, which, if the maternal system had been later than the paternal, would have lasted on into it, prove by their absence the priority of the maternal. Thus the present method confirms on an enlarged and firm basis the inference as to the antiquity of the maternal system arrived at by the pioneers of the investigation, Bachofen and McLennan, and supported by the later research of a generation of able investigators—Morgan, Lubbock, Bastian, Giraud-Teulon, Fison, Howitt, Wilken, Post, Lippert, and others. But this it is not, however, meant to imply that the maternal form of family as here set forth represents the primitive condition of mankind, but that it is a stage through which the inhabitants of a great part of the world now in the paternal appear to have passed, and which still continues in force over considerable tracts of every part of the globe except Europe. It seems probable that this maternal system arose out of an earlier and less organized and regulated condition of human life. As to this problem, however, though the present schedules are not devoid of information, I have not been able to bring the general evidence into shape sufficiently to justify my offering a theory here.

The analogy has already come into view between the division of society according to residence, and according to the maternal and paternal systems. This relation, the reality of which is evident from mere consideration of the difference as to family life which must ensue from the husband living in the wife's house or the wife living in the husband's, may be corroborated from the schedules. Thus the number of coincidences between peoples where the husband lives with the wife's family and where the maternal system prevails, is naturally large in proportion, while the full maternal system as naturally never appears among peoples whose exclusive custom is for the husband to take his wife to his own home. But as I have pointed out, the maternal and

paternal systems are not each a definite institution, but combinations in which more or less strictly the authority, descent, succession, inheritance follow the female or the male side. The imperfection of my schedules makes it desirable for me to postpone an attempt to work out numerically the intricate problem of the mutual relations of these social rules till more perfect data are accessible. I have made, however, a rough sketch illustrative of the hypothesis

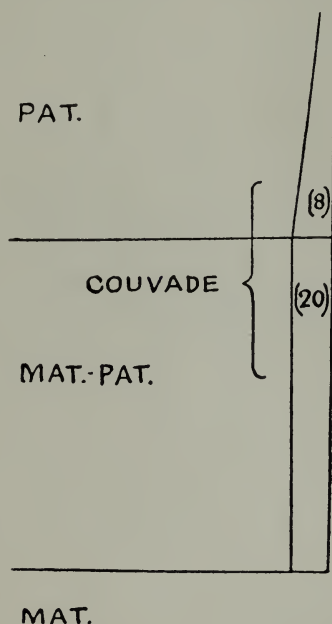


Fig. 4

suggested by the diagrams figs. 3 and 4, namely, that in the one simple fact of residence we may seek the main determining cause of the several usages which combine to form a maternal or paternal system. This sketch, fig. 5, is meant to suggest the social movement which the schedules seem to imply. Division according to residence on the female side is taken as the fundamental fact, and the lines show the institutions of female descent, avuncular authority, etc., arising in the stage of residence on the female side, and extending into the stages of removal and residence on the male side. Within these two latter stages it is that male descent, paternal authority, etc., arise and extend onward in history. This direction is indeed consistent with what our own knowledge of human nature would lead us to expect. We can well understand how when

the man lives in his wife's family his power will count for little against the combined authority of her maternal uncles and brothers, whereas when he takes her to his own home, he is apt to become master of the household; and we should expect the rules of descent, succession, and inheritance to follow the same order. Actual record of such transition is very rare, but at any rate

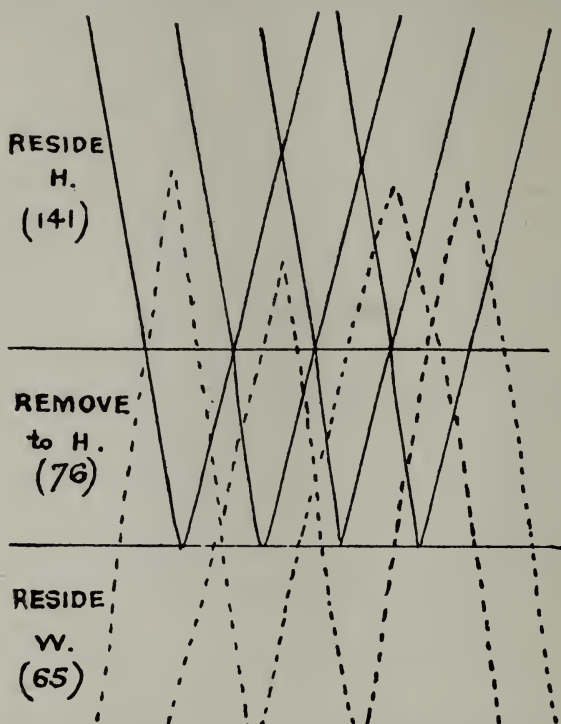


Fig. 5

one observer, the Hon. J. W. Powell, of the Bureau of Ethnology at Washington, has had both the opportunity to see and the skill to see what he was seeing, with the result of convincing himself that the transition from maternal to paternal society has in great measure depended on residence. I quote a passage of a letter from him: "It would seem from such opportunities as I have had to collect facts in the field that hunting and other parties are frequently organized in such a manner that the male members of a clan group proceed together in company with their wives and children. Under such cir-

cumstances the control of the family necessarily falls into the hands of the husbands and fathers." This happens among the Pueblo Indians, a matriarchal people with female descent, whose clans, in consequence of the scarcity of water for irrigation in their desert region, are obliged to separate widely for the cultivation of lands at a distance from the central Pueblo. The result is that the control of families and the training of children are temporarily taken out of the hands of their own kin on the mother's side, and with the acquisition of cattle in these new homes comes the tendency to settle there permanently. Observation of these facts led Major Powell to adopt the hypothesis that clanship by female descent passed in this way into clanship by male descent by the segregation of clans for industrial purposes.

The next diagram, fig. 6, throws more light on the great social transformation. It shows the distribution of the practice of marriage by capture. When the accounts of national custom are classified they show that capture (which belongs to over one hundred of the peoples scheduled) can be more or less accurately divided into three kinds: Hostile capture, when warriors of one tribe bring away as captives women of another tribe is a feat of arms praised in history short of the highest levels of culture. There were fierce Indians of the Pampas who held that their god, the Great Eagle, told them to live by making war on all other tribes, slaying their men and carrying off their women and children. The same spirit is heard in the hopes of Sisera's host to divide the spoil, to every man a damsel or two. Looking at hostile capture from the anthropological point of view, we have to notice that it exists equally through the three stages of society, from maternal to paternal. Now it obviously conflicts with full matriarchal institutions that a man should bring in a captive wife, for he cannot take her home to his mother-in-law. To understand such a custom appearing within the range of matriarchy at all, we must remember that a captive has no rights, so that what happens to her does not immediately affect the regular custom of the tribe, which applies to native free women. Yet even here the tendency of capture must always have been to upset the maternal arrangements. When capture comes to be an accepted mode of marriage between or among tribes or clans who live at peace and habitually intermarry, it is evident that such "connubial capture," as it is described on the diagram, can only consist with the paternal system, inasmuch as the husband necessarily carries the wife to his own home, thereby setting on foot a paternal household. This is true also of the cases where the capture has become a merely formal ceremony, accompanying a marriage settled beforehand, for the very form of capture involves the bridegroom coming with his friends to carry the bride to his home. This is the interpretation of the fact, made evident in the diagram, that connubial and formal capture belong only to the intermediate stage where paternal institutions are arising, and to the later stage where they are fully established. The effect of capture in breaking up the maternal system, and substituting the paternal for it, has thus to be taken into account as a serious factor in social development. There is at least

one region of the world where the operation may be seen going on at this day—the Malay Islands. To quote the concise description by Riedel of the matrimonial arrangements of the Babar Archipelago: "The men follow the women, and live in their houses. The children also belong to the wife's family. If a

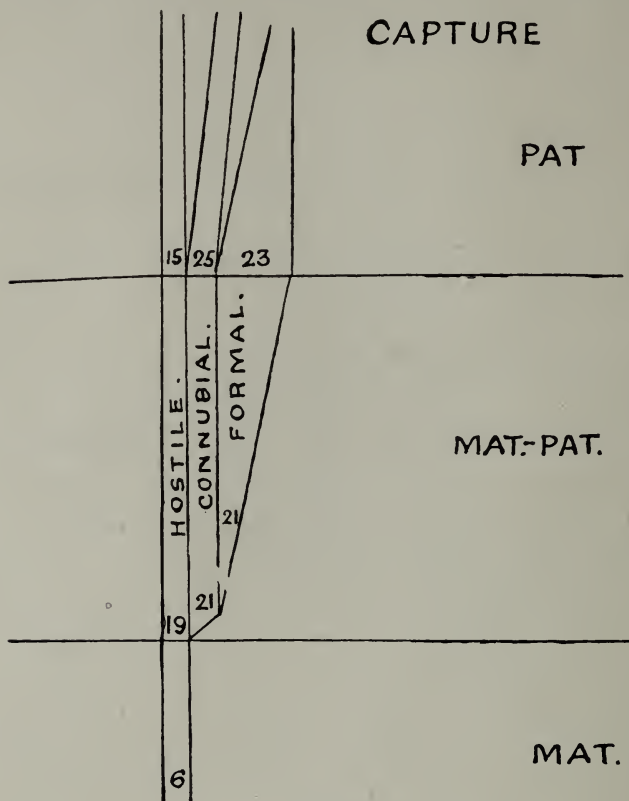


Fig. 6

man is rich enough he may marry seven wives, who all remain in the houses of their parents. A man who has many wives is respected. The robbery of a wife from another clan (*negari*) is an honor, and the children follow the father, with or without payment of the fine attached to the deed. Smaller or weaker clans even demand no fine." In the Kisar and Wetar island groups a like state of things appears, the maternal system being the recognized rule, but always liable to pass into the paternal system by capture, which brings wife and children into the husband's hands.

At this point it will be convenient to examine two institutions of early marriage law, namely, exogamy and classificatory relationship. The principle of exogamy was brought prominently into view fifty years ago, by Sir George Grey, when he described the native Australian rule for a man not to marry a woman of the same family name or bearing the same animal-crest or kobong as himself; and called attention to the coincidence of this with the North American system of clans named from totem animals, a man being bound to marry outside his own totem or clan. Mr. J. F. McLennan gave these customs the name of exogamy or "marrying-out," and showed them to belong to "a most widely prevailing principle of marriage law among primitive races." Much information has since then come in, with the result of showing that exogamy has hardly to do with the capture of wives in war between alien nations, but rather with the regulation of marriages within groups of clans or tribes who have connubium; such clans or tribes may be more or less at strife, but they acknowledge ties of kindred and are usually allied by language. It is now also understood that a people may at once practise endogamy or "marrying-in" within its borders, and exogamy or "marrying-out" of its clans with one another. The situation may be understood among the Hindus, where a man must marry in his caste, but within that caste must not marry in his own gotra or clan. The effect of an exogamic rule is similar whether clanship follows the female or male line of descent. Next, as to the principle of classificatory relationship, an early mention of this is by Father Lafitau, above one hundred and fifty years ago, who states that "among the Iroquois and Hurons all the children of a cabin regard all their mother's sisters as their mothers, and all their mother's brothers as their uncles, and for the same reason they give the name of fathers to all their father's brothers, and aunts to all their father's sisters. All the children on the side of the mother and her sisters, and of the father and his brothers, regard each other mutually as brothers and sisters, but as regards the children of their uncles and aunts, that is, of their mother's brothers and father's sisters, they only treat them on the footing of cousins. . . . In the third generation this changes, the great uncles and great aunts become again grandfathers and grandmothers of the children of those whom they called nephews and nieces. This continues always in the descending line according to the same rule." In our own time, Lewis H. Morgan, living among the Iroquois as an adopted Indian, was struck with this system of relationships, so unlike what he had been brought up among, and which he at first thought to be a peculiar invention of his Iroquois. But finding, on inquiry, that it extended to other North American tribes, he eventually by circulating interrogatories succeeded in collecting a great series of systems of relationship, in which he established the wide prevalence of classificatory systems, as he called them from the relatives being grouped in classes. Under the term classificatory systems, Mr. Morgan included not only those approximating to the Iroquois type, but a much simpler and ruder plan prevalent in Polynesia; it is, however, convenient for me to confine my remarks

here to the former group only. This system, as found among the American Indians, Mr. Morgan showed to be closely analogous to that of the Dravidian nations of Southern Hindustan. This latter is a well-known source of perplexity to a newly appointed English civilian, who may be told by a witness that his father was sitting in the house, but presently the same witness mentions his father as coming in from the field; the native is sharply reproved by the judge for contradicting himself, whereupon he explains, it was my "little father," by which he means his father's younger brother.

I am placing together the two institutions, exogamy and classificatory relationship, inasmuch as they are really connected, being in fact two sides of one institution. This was made out eight years ago, by the Rev. Lorimer Fison, in the work on the Kamilaroi and Kurnai tribes of Australia by him and Mr. Howitt. This important explanation is still scarcely known to anthropologists, nor indeed, have I much right to reproach others with neglecting it, for I reviewed Fison and Howitt's book without distinctly realizing the bearing of this argument on the theory of exogamy, which only came round to me lately in a way which I had better now describe, as it will enable me to explain shortly and plainly the whole problem. In tabulating the nations of the world, I found a group of twenty-one peoples whose custom as to the marriage of first cousins seemed remarkable; it is that the children of two brothers may not marry, nor the children of two sisters, but the child of the brother may marry the child of the sister. It seemed obvious that this "cross-cousin marriage," as it may be called, must be the direct result of the simplest form of exogamy, where a population is divided into two classes or sections, with the law that a man who belongs to Class A can only take a wife of Class B. Such a division, for instance, is familiar in Melanesia. Dr. R. H. Codrington describes it in the Banks Islands, where the natives have two families, called *veve*—mother, which implies that descent follows the mother's side, and a man must marry a wife of the other mother from himself, or as they say, not on his own side of the house but on the other. Thus, taking A, A, B, B, as males and females of the class A and B, and bearing in mind that the mother's children are of her class, but the father's children of the opposite class to his, we have:

Two sisters, A, A, their Children, A, A, are of same class = tribal brother and sister = unmarriageable	Two brothers, A, A, their Children, B, B, are of same class = tribal brother and sister = unmarriageable	Brother and sister, A, A, their Children, B, A, are of different class = tribal cousins = marriageable
---	--	--

Fig. 7

Having come to this point, it seemed to me that I had seen something like it elsewhere, and on looking back to "Kamilaroi and Kurnai" I found that Fison has thus worked out the origin of the Turanian classificatory system, as Morgan calls that including the above-mentioned systems of North America and India, with others. Fig. 8 puts concisely the main features of the argument as to a man's kin.

His
 father's brother's child
 or
 mother's sister's child } is (tribal) brother or sister,

Therefore
 father's brother is (tribal) father,
 mother's sister is (tribal) mother,

His
 father's sister's child
 or
 mother's brother's child } is tribal (cousin).

Therefore
 father's sister is (tribal) aunt,
 mother's brother is (tribal) uncle.

Fig. 8

Though not proposing to enter fully into the deduction of classificatory relationships in all their varieties from the rule of exogamy, it is necessary to point out that the form of exogamy here contemplated is the simplest or dual form, in which a people is divided into two intermarrying classes. Systems of exogamy which are dual in their nature, that is, consisting of two classes or groups of classes, stand in direct connection with cross-cousin marriage and classificatory relationship. But if the number of exogamic divisions is not dual, if there are for instance three clans, and a man of one clan may take a wife of either of the other two clans, it is readily seen that the argument of fig. 7 breaks down. Although at present only prepared to deal with exogamy and classificatory relationship in their dual form, I may notice that the treatment of the problem by the method of adhesions strengthens the view, not wanting in other evidence, that the dual form of exogamy may be considered the original form. In reckoning from the present schedules the number of peoples who use relationship names more or less corresponding to the classificatory systems here considered, they are found to be fifty-three, and the estimated number of these which might coincide accidentally with exogamy were there no close connection between them, would be about twelve. But in fact the number of peoples who have both exogamy and classification is thirty-three, this strong coincidence being the measure of the close causal connection subsisting between the two institutions. The adherence is even

stronger as to cross-cousin marriage, of which twenty-one cases appear in the schedules, no less than fifteen of the peoples practising it being also known as exogamous. Here, indeed, the relation is not one of derivation, but of identity, the cross-cousin rule being actually a partial form or imperfect statement of the law of exogamy itself. Such adhesions between two or more customs have been already recognized as proving the existence of causal connection, but it has now to be pointed out that they serve another purpose. The connection, when proved, reacts on the evidence by which it was proved. When once it has been shown that cross-cousin marriage is part and parcel of exogamy, it may be argued that all the twenty-one peoples practising cross-cousin marriage are to be set down as exogamous. Now as only fifteen of them are expressly recorded to be so, the list of exogamous nations of the world has to be increased by six. So, classificatory relationship being evidence that the peoples practising it are or have been exogamous, this will add some twenty more to the list of nations among whom further investigation will probably disclose record that exogamic society once prevailed or still prevails. Even if no direct record is forthcoming, the indirect proof may with due caution be sufficient for placing them in the exogamous group, which may thus number above one hundred peoples out of the three hundred and fifty of the world. Those who remember the sharp discussion between McLennan and Morgan years ago, and the view that the classificatory relationships were a mere system of addresses, will be struck with the way in which the controversy is likely to end. For myself I hardly know whether I feel more glad or sorry that my old friend McLennan to the day of his death never knew that Morgan and he, who believed themselves adversaries, were all the while allies pushing forward the same doctrine from different sides.

It thus appears that the number of nations who have the system of intermarrying clans is larger than has been known. But even this by no means measures the full importance of exogamy as a factor in the constitution of society. Anthropologists have long had before them the problem of determining how far clan-exogamy may have been the origin of the prohibited degrees in matrimony so variously defined in the laws of nations. The yet larger problem has been opened, how far laws of permission and prohibition of marriage may have led nations to define relationships and give them names, distinguishing for instance uncles from fathers, and cousins from brothers. It may, I think, conduce to the solution of these problems to notice two ways in which the collation of the present tables bears on the meaning and origin of exogamy.

There are conditions of society under which exogamy is found side by side with wife-capture, so that a barbaric marriage often involves both in one and the same act, as when a Tatar and a party of his friends, all armed to the teeth, ride off to the tents of a distant clan, and thence with simulated or even real violence carry off a bride. But on reckoning up the peoples among whom this combination of capture and exogamy is found, the number, though enough to

show that they co-exist freely, falls short of what would justify the inference that they are cause and effect. Moreover, it appears that this co-existence belongs especially to the paternal stage of society, and to the maternal-paternal, in which paternal influence is partly established. This is intelligible enough from what has been already said as to the effect of capture in setting on foot paternal institutions, from its very outset, by bringing the wife into the husband's hands and home. We are thus led to a more fundamental test of the position of exogamy, by inquiring whether it existed in that earliest known stage of the maternal system of society, where the husband lives in the wife's family. The schedules show that there are in different parts of the world twelve or thirteen well-marked exogamous peoples whose habit of residence is for the husband to join the wife's family. This state of things seems to me to prevent our regarding exogamy as a result of capture, it being plain that the warrior who has carried a wife captive from a hostile tribe does not take up his abode in her family. If capture leads to any form of exogamy, this must, I think, be a paternal form, and if it be admitted that the maternal form is earlier, then it follows that capture is inadmissible as the primary cause of exogamy.

More than twenty years ago, in compiling a list of nations practising this custom of marrying out of the tribe or kin, I noticed that in any full discussion of the subject would have to be considered the wish to bind different tribes together in friendship by intermarriage. Compiling the present tables has brought together observations to this effect. Morgan, describing how the alliance of the Iroquois tribes, made up of intermarrying clans, formed a bond of union throughout the national league, writes: "It was the boast of the Iroquois that the great object of their confederacy was peace; to break up the spirit of perpetual warfare, which has wasted the red race from age to age." Another group of North American tribes, the Tinneh, on the Arctic circle, are divided into three castes, their rule being that, for instance, a Chit-sangh may not marry a Chit-sangh. When this does take place, the persons are ridiculed and laughed at, the man is said to have married his sister, even though she may be from another tribe, and there be not the slightest connection by blood between them. Hardisty, who gives these details, remarks: "One good thing proceeded from the above arrangement, it prevented war between two tribes who were naturally hostile." The Bogos of Abyssinia are exogamous, and of them Munzinger reports that they are closely bound together by reciprocal marriages, "so that internal war is almost impossible. Blood-quarrels among the Bogos are always settled very quickly, whilst the smallest collision with the adjoining tribes leads to everlasting wars." Du Chaillu writes of Ashango-land, "tribes and clans intermarry with each other and this brings about a friendly feeling among the people. People of the same clan cannot intermarry with each other." Thus, it seems that when Plutarch asks in the "Roman Questions," "Why do they not marry women near of kin?" he has some reason in setting down as one

possible answer, "whether from their wishing to increase friendships by marriages, and to acquire many kinsfolk, giving wives to others and receiving (wives) from them."

On looking at the distinction between endogamy and exogamy from this point of view, it will be seen that there is a period in the growth of society when it is a political question of the first importance. While the vast forest or prairie still affords abundant food for a scanty population, small hordes may wander, or groups of households may be set up, each little tribe or settlement cut off from the rest, and marrying within its own border. But when tribes begin to adjoin and press on one another and quarrel, then the difference between marrying-in and marrying-out become patent. Endogamy is a policy of isolation, cutting off a horde or village, even from the parent-stock whence it separated, if only a generation or two back. Among tribes of low culture there is but one means known of keeping up permanent alliance, and that means is intermarriage. Exogamy, enabling a growing tribe to keep itself compact by constant unions between its spreading clans, enables it to overmatch any number of small intermarrying groups, isolated and helpless. Again and again in the world's history, savage tribes must have had plainly before their minds the simple practical alternative between marrying-out and being killed out. Even far on in culture, the political value of intermarriage remains. "Matrimonial alliances increase friendship more than aught else," is a maxim of Mohammed. "Then will we give our daughters unto you, and we will take your daughters to us, and we will dwell with you, and we will become one people," is a well-known passage of Israelite history.

Exogamy lies far back in the history of man, and perhaps no observer has ever seen it come into existence, nor have the precise conditions of its origin yet been clearly inferred. Even the historical relation between exogamy and the system of classes known as totemism is not fully cleared up; whether as Prof. Robertson Smith takes it, totemism supplied the necessary machinery for working a law of exogamy, or whether exogamy itself led to totemism. But as to the law of exogamy itself, the evidence shows it in operation over a great part of the human race as a factor of political prosperity. It cannot be claimed as absolutely preventing strife and bloodshed, indeed, it has been remarked of some peoples, such as the Khonds and the Banks Islanders, that the intermarrying clans do nevertheless quarrel and fight. Still by binding together a whole community with ties of kinship and affinity, and especially by the peacemaking of the women who hold to one clan as sisters and to another as wives, it tends to keep down feuds and to heal them when they arise, so as at critical moments to hold together a tribe which under endogamous conditions would have split up. Exogamy thus shows itself as an institution which resists the tendency of uncultured populations to disintegrate, cementing them into nations capable of living together in peace and holding together in war till they reach the period of higher military and political organization. Seen from this point of view, the remarkable fact is more easily understood that

exogamy, passing on from the maternal to the paternal stage of society, shifts its prohibitions from the female to the male line of descent, now allowing marriages which it treated formerly as incestuous, while prohibiting others which it formerly allowed without scruple. This transformation has been taking place within recent times among Malay and American tribes, and seems to be even going on still, it making no difference politically whether kinship follows the female or male line, if only marrying-out causes the requisite intermixture of the clans. In this connection it is worth while to notice that there are a small number of peoples in different parts of the world, who have a rule of exogamy not depending on kinship at all. For instance, Piedrahita relates of the Panches of Bogota, that those of one town did not marry any woman thereof, as all held themselves brothers, and the impediment of kinship was sacred to them, but such was their ignorance that if a sister were born in a different town from her brother, he was not prevented from marrying her. An anthropologist, with the list before him of the peoples who prohibit a man from marrying in his own village, might explain this not as a result of ignorance, but as an extreme case of what may be called "local exogamy."

The results here brought forward make no approach to exhausting the possible inferences to be drawn from the tables. These need not even be confined to working out the development of customs found in existence somewhere on the globe, but may in some measure restore knowledge of forms of society now extinct. Interesting, however, as these problems are, I am more anxious to bring under discussion the method by which they are here treated, how imperfectly I am well aware. The interpretations offered will have to be corrected, the tabulated material improved in quantity and quality and the principles it involves brought out more justly, yet at any rate it will remain clear that the rules of human conduct are amenable to classification in compact masses, so as to show by strict numerical treatment their relations to one another. It is only at this point that speculative explanation must begin, at once guided in its course and strictly limited in its range by well-marked lines of fact to which it must conform. The key of the position is, as that veteran anthropologist, Prof. Bastian, of the Berlin Museum, is never weary of repeating, that in statistical investigation the future of anthropology lies. As soon as this is systematically applied, principles of social development become visible. Even the diagrams of this paper may suffice to show that the institutions of man are as distinctly stratified as the earth on which he lives. They succeed each other in series substantially uniform over the globe, independent of what seem the comparatively superficial differences of race and language, but shaped by similar human nature acting through successively changed conditions in savage, barbaric, and civilized life.

The treatment of social phenomena by numerical classification will, it must be added, react on the statistical material to which the method is applied. It is in classifying the records of tribes and nations that one becomes fully aware of their imperfect and even fragmentary state. The descriptions

happily tend to correct one another's errors but the great difficulty is blank want of information. As for extinct tribes, and those whose native culture has been re-modelled, there is nothing to be done. But there are still a hundred or more peoples in the world, among whom a prompt and minute investigation would save some fast vanishing memory of their social laws and customs. The quest might be followed up internationally, each civilized nation taking in hand the barbaric tribes within its purview. The future will, doubtless, be able to take care of itself as to most branches of knowledge, but there is certain work which if it is to be done at all, must be done by the present.

32. ESKIMO SOCIETY¹

By FRANZ BOAS

TRAVEL AND VISITS

In treating of the single tribes, the routes were mentioned which are followed by the natives as they travel from shore to shore and from settlement to settlement. These routes are established by tradition and the Eskimo never stray from them. In order to obtain a more thorough understanding of the migrations of single individuals and of families, the relations between the tribes and the settlements must be discussed.

By the lively intercourse which is always kept up between the settlements, it cannot fail that marriages between members of different tribes should be of frequent occurrence and that many ties of affinity and consanguinity should thus be created. These relations, however, as distances increase, quickly become less common. For instance, in Cumberland Sound three people are found belonging to Tununirn, about ten belonging to Akudnirn, and quite a number coming from Padli. Also, two Sikosuilarmiut live there, a few natives of Akuliaq and Qaumauang, and very many Nugumiut. Hall's accounts concerning the Nugumiut and the Aivillirmiut prove a similar proportion of strange natives among these tribes. Every tribe may be said to bring together its immediate neighbors, as it is closely related to them, while those which are separated by the tribe itself are strangers to one another. The importance of this mediate position is regulated by the strength of the tribe, by the significance of the country in reference to its produce, and by the routes crossing it. . . .

Between tribes that are strangers to one another ceremonies of greeting are customary which are not adapted to facilitate intercourse. The ceremonies will be described further on. . . .

Among neighboring tribes these ceremonies are dispensed with, for instance, between the Padlimiut and Oqomiut, Padlimiut and Akudnirmiut, while a Nugumio or an Akudnirmio unknown in Oqo has there to go through the whole of the performance. The exception in favor of the former tribe is doubtless due to the frequent intermarriages with those tribes, whereby a constant acquaintance is kept up.

¹Selected from pages 462-466, 578-582, 609 of Franz Boas, "The Central Eskimo," *Sixth Annual Report of the Bureau of American Ethnology*, pages 399-669, 1888.

Real wars or fights between settlements, I believe, have never happened, but contests have always been confined to single families. The last instance of a feud which has come to my knowledge occurred about seventy years ago. At that time a great number of Eskimo lived at Niutang, in Kingnait Fjord, and many men of this settlement had been murdered by a Qinguamio of Anarnitung. For this reason the men of Niutang united in a sledge journey to Anarnitung to revenge the death of their companions. They hid themselves behind the ground ice and killed the returning hunter with their arrows. All hostilities have probably been of a similar character. . . .

The reasons for the frequent removals of individual Eskimo to strange tribes are to be looked for in the customs of the natives. I can only mention here that intermarriage, adoption, and the fear of blood vengeance are the principal ones.

It is peculiar to the migratory habits of the Eskimo that almost without exception the old man returns to the country of his youth, and consequently by far the greater part of the old people live in their native districts. . . .

SOCIAL ORDER AND LAWS

The social order of the Eskimo is entirely founded on the family and on the ties of consanguinity and affinity between the individual families. Generally children are betrothed when very young, but these engagements, not being strictly binding, may be broken off at any time. When the children reach maturity the girl learns the duties of a woman and the boy those of a man. As soon as he is able to provide for a family and she can do the work falling to her share, they are allowed to marry. It happens frequently that the young man's parents are unwilling to allow him to provide for his parents-in-law, and then he may be rejected at any moment. Usually the young couple must begin housekeeping with the young wife's family and the young man, if belonging to a strange tribe, must join that of his wife. It is not until after his parents-in-law are dead that he is entirely master of his own actions. Though the betrothal be entered into in the days of childhood the bride must be bought from the parents by some present. In other instances the men choose their wives when grown up and sometimes a long wooing precedes the marriage. The consent of the bride's parents, or, if they are dead, that of her brothers, is always necessary. Marriages between relatives are forbidden: cousins, nephew and niece, aunt and uncle, are not allowed to intermarry. There is, however, no law to prevent a man from marrying two sisters. It is remarkable that Lyon states just the reverse. I am sure, however, that my statements are correct in reference to the Davis Strait tribes.

Should the newly married couple join the wife's family this would serve as a check to polygamy, which, however, is quite allowable. It is only when the new family settles on its own account that a man is at full liberty to take additional wives, among whom one is always considered the chief wife.

Monogamy is everywhere more frequent than polygamy, only a very few men having two or more wives. According to Ross polyandry occurs with the Netchillirmiut. As long as the mother-in-law lives with the young family the wives are subordinate to her, while the mothers of both parties are independent of each other. No example came to my notice of both parents living with the newly married couple. Sometimes the man and wife did not set up a new household at once, but each remains at home. The property necessary for establishing a new family is the hunting gear of the man and the knife, scraper, lamp, and cooking pot of the woman.

A strange custom permits a man to lend his wife to a friend for a whole season or even longer and to exchange wives as a sign of friendship. On certain occasions it is even commanded by a religious law. Nevertheless I know of some instances of quarrels arising from jealousy. Lyon states, however, that this passion is unknown among the Iglulirmiut. The husband is not allowed to maltreat or punish his wife; if he does she may leave him at any time, and the wife's mother can always command a divorce. Both are allowed to remarry as soon as they like, even the slightest pretext being sufficient for a separation.

I may be allowed to refer once more to the division of labor between the man and woman. The principal part of the man's work is to provide for his family by hunting, *i.e.*, for his wife and children and for his relatives who have no provider. He must drive the sledge in travelling, feed the dogs, build the house, and make and keep in order his hunting implements, the boat cover and seal floats excepted. The woman has to do the household work, the sewing, and the cooking. She must look after the lamps, make and mend the tent and boat covers, prepare the skins, and bring up young dogs. It falls to her share to make the inner outfit of the hut, to smooth the platforms, line the snow house, etc. On Davis Strait the men cut up all kinds of animals which they have caught; on Hudson Bay, however, the women cut up the seals. There the men prepare the deerskins, which is done by the women among the eastern tribes. Everywhere the women have to do the rowing in the large boats while the man steers. Cripples who are unable to hunt do the same kind of work as women.

Children are treated very kindly and are not scolded, whipped or subjected to any corporal punishment. Among all the tribes infanticide has been practised to some extent, but probably only females or children of widows or widowers have been murdered in this way, the latter on account of the difficulty of providing for them. It is very remarkable that this practice seems to be quite allowable among them, while in Greenland it is believed that the spirit of the murdered child is turned into an evil spirit, called *angiaq*, and revenges the crime.

Besides the children properly belonging to the family, adopted children, widows, and old people are considered part of it. Adoption is carried on among this people to a great extent.

If for any reason a man is unable to provide for his family or if a woman cannot do her household work, the children are adopted by a relative or friend, who considers them as his own children. In the same way widows with their children are adopted by their nearest relative or by a friend and belong to the family, though the woman retains her own fireplace.

It is difficult to decide which relative is considered the nearest, but the ties of consanguinity appear to be much closer than those of affinity. If a woman dies the husband leaves his children with his parents-in-law and returns to his own family, and if a man dies his wife returns to her parents or her brothers who are the nearest relatives next to parents or children. When a woman dies, however, after the children are grown up the widower will stay with them. In case of a divorce the children generally remain with the mother.

As a great part of the personal property of a man is destroyed at his death or placed by his grave, the objects which may be acquired by inheritance are few. These are the gun, harpoon, sledge, dogs, kayak, boat, and tent poles of the man and the lamp and pots of the woman. The first inheritor of these articles is the eldest son living with the parents. Sons and daughters having households of their own do not participate in the inheritance. An elder adopted son has preference over a younger son born of the marriage. Details of the laws which relate to inheritance are unknown to me.

Sometimes men are adopted who may almost be considered servants. Particularly bachelors without any relations, cripples who are not able to provide for themselves, or men who have lost their sledges and dogs are found in this position. They fulfill minor occupations, mend the hunting implements, fit out the sledges, feed the dogs, etc.; sometimes, however, they join the hunters. They follow the master of the house when he removes from one place to another, make journeys in order to do his commissions, and so on. The position, however, is a voluntary one, and therefore these men are not less esteemed than the self dependent providers.

Strangers visiting their friends for a season are generally in a similar position, though they receive a wife if the host happens to have more than one; if the friend has hunting gear, a sledge, and dogs of his own, he can arrange a separate fireplace in the hut.

In summer most families have each their own tent, but in the fall from two to four join in building a house. Frequently the parents live on one side, the family of the son-in-law on the other, and a friend or relative in a small recess. Sometimes two houses have a common entrance or the passages communicate with one another. The inhabitants of both parts usually live quite independently of one another, while the oldest man of every house has some influence over his housemates.

If the distance between the winter and the summer settlement is very great or when any particular knowledge is required to find out the haunts of game, there is a kind of chief in the settlement, whose acknowledged authority is, however, very limited. He is called the *pimain* (*i.e.*, he who knows every-

thing best) or the issumautang. His authority is virtually limited to the right of deciding on the proper time to shift the huts from one place to the other but the families are not obliged to follow him. At some places it seems to be considered proper to ask the pimain before moving to another settlement and leaving the rest of the tribe. He may ask some men to go deer hunting, others to go sealing, but there is not the slightest obligation to obey his orders.

Every family is allowed to settle wherever it likes, visiting a strange tribe being the only exception. In such a case the newcomer has to undergo a ceremony which consists chiefly in a duel between a native of the place and himself. If he is defeated he runs the risk of being killed by those among whom he has come.

There are numerous regulations governing hunting, determining to whom the game belongs, the obligations of the successful hunter towards the inhabitants of the village, etc.

When a seal is brought to the huts everybody is entitled to a share of the meat and blubber, which is distributed by the hunter himself or carried to the individual huts by his wife. This custom is only practised when food is scarce. In time of plenty only the housemates receive a share of the animal.

A ground seal belongs to all the men who take part in the hunt, the skin especially being divided among them. A walrus is cut up at once into as many parts as there are hunters, the one who first struck it having the choice of the parts and receiving the head. A whale belongs to the whole settlement and its capture is celebrated by a feast.

A bear or a young seal belongs to the man who first saw it, no matter who kills it.

Lost objects must be restored to the owner if he is known, game, however, excepted; for example, if a harpoon line breaks and the animal escapes, but is found later by another man, the game belongs to the latter. In Hudson Bay he is also allowed to keep the harpoon and line.

There is no way of enforcing these unwritten laws and no punishment for transgressors except the blood vengeance. It is not a rare occurrence that a man who is offended by another man takes revenge by killing the offender. It is then the right and the duty of the nearest relative of the victim to kill the murderer. In certain quarrels between the Netchillirmiut and the Aivillirmiut, in which the murderer himself could not be apprehended, the family of the murdered man has killed one of the murderer's relations in his stead. Such a feud sometimes lasts for a long time and is even handed down to a succeeding generation. It is sometimes settled by mutual agreement. As a sign of reconciliation both parties touch each other's breast, saying, *Ilaga* (my friend).

If a man has committed a murder or made himself odious by other outrages he may be killed by any one simply as a matter of justice. The man who intends to take revenge on him must ask his countrymen singly if each agrees in the opinion that the offender is a bad man deserving death. If all answer

in the affirmative he may kill the man thus condemned and no one is allowed to revenge the murder.

Their method of carrying on such a feud is quite foreign to our feelings. Strange as it may seem, a murderer will come to visit the relatives of his victim (though he knows that they are allowed to kill him in revenge) and will settle with them. He is kindly welcomed and sometimes lives quietly for weeks and months. Then he is suddenly challenged to a wrestling match, and if defeated is killed, or if victorious he may kill one of the opposite party, or when hunting he is suddenly attacked by his companions and slain.

CEREMONIES OF GREETING

If a stranger unknown to the inhabitants of a settlement arrives on a visit he is welcomed by the celebration of a great feast. Among the southeastern tribes the natives arrange themselves in a row, one man standing in front of it. The stranger approaches slowly, his arms folded and his head inclined toward the right side. Then the native strikes him with all his strength on the right cheek and in his turn inclines his head awaiting the stranger's blow (*tigluq-djung*). While this is going on the other men are playing at ball and singing (*igdlukitaqtung*). Thus they continue until one of the combatants is vanquished.

The ceremonies of greeting among the western tribes are similar to those of the eastern, but in addition "boxing, wrestling, and knife testing" are mentioned by travelers who have visited them. In Davis Strait and probably in all the other countries the game of "hook and crook" is always played on the arrival of a stranger (*pakijumijartung*). Two men sit down on a large skin, after having stripped the upper part of their bodies, and each tries to stretch out the bent arm of the other. These games are sometimes dangerous, as the victor has the right to kill his adversary; but generally the feast ends peaceably. The ceremonies of the western tribes in greeting a stranger are much feared by their eastern neighbors and therefore intercourse is somewhat restricted. The meaning of the duel, according to the natives themselves, is "that the two men meeting wish to know which of them is the better man." The similarity of these ceremonies with those of Greenland, where the game of hook and crook and wrestling matches have been customary, is quite striking, as is that of the explanation of these ceremonies.

The word for greeting on Davis Strait and Hudson Strait, is *Assojutidlin?* (Are you quite well?) and the answer, *Tabaujuradlu* (Very well). The word *Taima!* which is used in Hudson Strait, and *Manetaima!* of the Netchilirmiut seem to be similar to our *Halloo!* The *Ukusiksalirmiut* say *Ilaga!* (My friend!).

33. MARRIAGE AND SOCIETY AMONG THE CROW INDIANS¹

By ROBERT H. LOWIE

MARRIAGE

A man had a preëmptive right to the younger sisters of a woman he had bought in marriage. Some men married a brother's widow; this was called "keeping a brother's wife."

As explained in my previous paper, there was abundant opportunity for philandering on such occasions as berry-picking and it happened that young people would form a permanent attachment on such occasions without further ceremony. This type of union was called "taking each other." Sometimes a young man used a go-between to make an offer to a young woman, and this was designated as "talking towards a woman."

The most honorable form of marriage was buying a wife, "paying for her." That is, a man would give horses to her male relatives and meat to her mother. It was usually a young, good-looking and virtuous woman who was purchased but it did not matter whether she had been previously married. "Men," said Gray-bull, "would buy a woman who was not crazy. The Lumpwoods never came to the door of my tipi to take away my last wife. That is the sort of wife we paid for." This is an allusion to the custom by which a member of the Lumpwood or rival Fox organization might carry off the wife of a member of the other society provided he had ever been on terms of intimacy with her.

Women stolen in this fashion were not usually kept for any length of time. Shell-necklace abducted three women in this manner but did not live with any of them longer than twenty days. He let them stay in a lodge other than his real wife's. There were some men who would keep these stolen women but the majority sent them away with such words as, "I have done marrying you, go away!" After this any man might marry her without being disgraced, except the husband from whose lodge she had been stolen.

When a woman abandoned a man she disliked, this was called "disliking a man." Shell-necklace said, contrary to Gray-bull's earlier statement, that in such a case the husband recovered the property he had paid for her. A woman's relatives sometimes tried to dissuade her from running away from her husband.

¹From pages 74-82 of Robert H. Lowie, "Notes on the Social Organization and Customs of the Mandan, Hidatsa, and Crow Indians," *Anthropological Papers of the American Museum of Natural History*, volume 21, part 1, New York, 1917.

The attitude of divorced spouses towards each other in later life naturally differed with different individuals. One interpreter told me that his father and mother hated each other and never had any social intercourse. Correspondingly, Young-crane informed me that she at first refused to be adopted into the Tobacco society by her former husband, Hunts-the-enemy, but was finally persuaded by her then husband, Crazy-dog. On the other hand, there are cases of divorced mates who converse on amicable terms.

Some concrete data as to married life are of considerable interest.

Young-crane married . . . a chief . . . He had already married her elder sister and at the time of his death had two other wives,—one of them a relative. . . . The three related women inhabited the same lodge, while the fourth wife lived in a separate tipi; but sometimes all the wives of a man, even if unrelated, lived together. This first husband had been married to a wife whom he divorced and by whom he had four children. When he took to wife Young-crane, he gave her elder brother two horses and other presents. She had no children by him, but her eldest sister had three, of whom Packs-hat is the oldest. He has always called Young-crane "mother"; when she later married Hunts-the-enemy, Packs-hat called him "father," as he also did his own mother's second husband; he continued to address Hunts-the-enemy in this way even after Young-crane's divorce from him, and later when she married Crazy-head called him "father" also. Young-crane's first husband was killed and after awhile she had Hunts-the-enemy for a lover and accordingly married him without purchase. However, he also took to wife a relative of Young-crane's whom she designated as her grandchild and who called her husband "father." This angered her. All the people thought Hunts-the-enemy had done something wrong in marrying a girl who called him "father" and said he was crazy. Accordingly, Young-crane separated from him. Later Crazy-head wished to marry her, and since he was a chief her brothers advised her to take him, and so she did without being purchased.

When Gray-bull was about twenty-two, he married for the first time. He had been out on a war party and when he came back he found a young woman who had come to his home, so he married her. She had a son by him, but the boy died. After about four years of marriage, she discovered that her husband had been out berry-picking with another young woman, so she got angry and told him to marry her rival. Accordingly, Gray-bull threw all her belongings out of the tent, and she left him. Then Gray-bull went to where his sweetheart was and married her without purchase. She was stolen by the Lumpwoods and Gray-bull never went near her for a year, and even then he did not seek her but she came to him. However, he did not keep her permanently. It was only for his last wife that property was paid. She was a virtuous woman, the widow of a brother of Gray-bull's, who had been killed. When Gray-bull's mother urged him to marry this woman, he at first declined, but at last consented. Then another brother of his took a horse and some property to the widow's mother, the horse being for the widow's father and the other gifts

for her brothers. Some time after this one of the woman's brothers bade him stay in his lodge. Then one of her brothers came, stood outside the tipi, and called Gray-bull. Then he went with them and two of his own brothers to the woman's lodge. She was seated on a fine bed and had a backrest there. Gray-bull's brothers went to the rear and sat down, and all of them received food. When they had eaten, the brothers went home and Gray-bull remained and lay with his wife. He felt bashful because she had not been his mistress before.

POSITION OF WOMEN

The fact that the women certainly perform all the menial household duties and are ordered about by their husbands in regard to bringing water and the like is likely to convey the idea that the position of women was a very inferior one in Crow society. Random references to women in myth and song, and indeed the deliberate bravado with which the ideal Crow man might discard his wife at a dance or allow her to be abducted by a rival organization, tend to confirm this impression.

Nevertheless, as in the case of sexual morality, superficial appearances are in a measure deceptive as to the real native point of view. In the first place, it is worth noting what a woman exercises definite property rights. In buying specimens I noticed repeatedly that husbands did not attempt to influence, let alone force, wives in regard to the sale of their belongings. It is further noteworthy that while women were naturally barred from the distinctively military men's clubs they play an important part in the sacred Tobacco society. Women secured visions, though less frequently than men; and some of them were medical practitioners and exercised supernatural powers. As the Crow had a very definite conception of ideal manhood, so they have a clear notion of what a woman should be,—virtuous, skilled in feminine accomplishments, physically attractive. This complex is summed up in the expression "She is a good woman," which perhaps corresponds to our "perfect lady" with the addition of good looks. A woman of this type was certainly well thought of and might exert considerable influence on her husband.

It is further clear that the bold face put on when a woman was abducted often merely served as a mask for profound grief. Indeed the stoical decorum so emphatically demanded by tribal etiquette indicates how difficult an achievement this triumphing over one's emotions was considered. When Gray-bull lost his wife in the spring contest of the Foxes and Lumpwoods he bravely bade her go with his rival, but interrupting his narrative at this point he said to me, "If you have ever been married, you know how this felt."

Whether what has been called "romantic love" is less common among the Indians than in our own everyday life, it would be difficult to say. An educated interpreter ridiculed the notion of a man's committing suicide because of unrequited affection, but Werthers are not so common among us as

he seems to have inferred from a reading of novels. At all events, Crow literature also comprises narratives of a hero undergoing dangers and achieving arduous tasks "all for the love of a lady," while one story recounts how a young woman braved all the perils and privations of a long overland journey through hostile territory in order to reach her disabled sweetheart.

SEXUAL MORALITY

In his discussion of the social life of the Yukaghir, Mr. Jochelson emphasizes the difference between theory and practice as regards the sexual relations of this people. Exactly the same point may be made with regard to the Crow. In practice there is a great looseness of manners, though the established rules of propriety are strictly observed.² War and love are described as the old Crow men's principal occupations, and the mythology, the reminiscences of informants, and ancient songs are all surcharged with evidence of the tendency to apparently unlimited philandering. To a superficial observer it would appear as though this masculine license were even today extended to the female sex. Young women of notorious immorality are not only not regarded as outcasts but in some instances are even taken to wife by young men who to all appearances might have made better matches. Their outward treatment, whether they are married or not, seems to differ not one whit from that accorded to other women.

Nevertheless, as already explained, the Crow have very definite ideals of feminine purity. A man certainly prides himself on being married to a woman of irreproachable chastity, and a wife of this type enjoys a very different reputation and social status from that of a "crazy" one, as unchaste women are usually described. On public occasions precedence was yielded to the virtuous women. When Young-jack-rabbit had distinguished himself in battle, his grandmother, who "had never done anything wrong," led him about camp and sang his praises. During the Sun dance the highly honorary office of tree-notcher was bestowed on a woman who had been taken to wife in the most honorable way, i. e., one who had not run away with her lover but had been decently married by purchase, and who had been uniformly faithful to her husband. Chastity was likewise a prerequisite for another office in the same ceremony.

There can be no doubt that even theoretically there was a double standard of morality. No one thought any the worse of a man of prominence for having indulged in numerous love affairs: these were rather regarded as his rightful share of the good things of life. When a young man had assumed the especially dangerous office of a Crazy Dog, an old man would lead him through camp, announcing that since he was going to die the girls of the tribe who wanted

²Thus, my interpreter twitted me with the fact that while whites censured the Indian's immorality a brother would not hesitate to speak freely with his sister, which no decent Crow would do.

to become his sweethearts must hasten to make overtures to him. One of my youngest interpreters, who had recently been married, would speak quite freely of the possibility of amours with other women, but he became grave in considering the case of his wife being disloyal. "Do you know what I should do?" he asked me; "I should never look at her or have anything more to do with her."

That, however, a certain preferential respect was accorded to a man of virtue is shown by another Sun dance usage. An expedition for the purpose of bringing white clay was always led by a man who had never taken liberties with any women but his own wife, even in the case of licensed privileges. . . .

ETIQUETTE

When a visitor comes to a tipi, the host may say *kahé* by way of greeting, and this interjection is also used in addressing supernatural beings in prayer. If the inmates of the lodge happen to be outside they may say to the guest, *birē'ri'*, "Enter." He is made to sit in the rear of the lodge, the place of honor. If a woman is visited by her husband's wife or an adopted child, she bids them sit in the rear; other female visitors sit anywhere.

A man does not enter a lodge if his sister or brother-in-law or any of the wife's relatives comprised under the term *usu'a* is there alone. If he finds any woman alone in a lodge, he is not likely to enter unless she is a sister-in-law; and correspondingly a woman does not enter a lodge where she sees a man by himself unless he be a lover or a relative other than a brother.

If a visitor comes with his wife, they take seats opposite to the host and his wife, but if that side is occupied they go to the rear. When they have no visitors, a couple usually occupies the place where the blankets are spread for sleeping, generally on the sides. . . .

No matter at what time of day a visitor arrives, food of some sort is at once offered to him or her. In the old days this consisted mainly of pounded meat or something of the sort. It was not obligatory to eat up everything; sometimes a visitor would take home what was left. This was considered perfectly proper: "It did not matter." Sometimes a guest would ask for a container in which to take the food home. The hosts do not have to eat at the same time with their visitors. In the old days the people ate when they were hungry.

I have myself had occasion to observe again and again that guests do not usually eat in the immediate company of their hosts even if all partook of food at the same time. The usual arrangement is for each family to eat by themselves. Sometimes my interpreter and I ate separately from the other people; and almost always every man formed a distinct group with his wife and children, so that on some occasions there were as many as four groups. Once Bright-wing was seen to join Magpie and his wife, which Gray-bull explained by saying the former was Magpie's brother.

When people meet outdoors, they do not use any expression corresponding to our passing the time of day but will probably ask, "Where do you come from?" or "What are you doing?" On my return to the Crow Reservation one summer, an Indian greeted me with the remark: "I am glad to see you" (literally, I see you, I am better). On a similar occasion a Crow said, "This dear man has come, it seems."

Crow men do not kiss their wives or sweethearts publicly; only young children are kissed in the presence of other people. However, I have seen a newly married young man caressing his wife though without kissing her.

In referring to a deceased person, particularly if related to one present, it is customary to use a euphemism, saying not "He is dead," but "He is not here." Thus, my interpreter designated Gray-bull's dead wife in speaking to her husband.

A man often refers deprecatingly to his own achievements, but this is mock-modesty and he knows perfectly well that his audience is perfectly aware of the facts. Once Gray-bull, in spite of his excellent war record, adopted this tone, saying, "I have never done anything in war." Young-crane, his son's mother-in-law, fearing that I might misunderstand, at once explained that Gray-bull was a very brave man indeed.

34. THE IROQUOIS GENS¹

By LEWIS H. MORGAN

The experience of mankind, as elsewhere remarked, has developed but two plans of government, using the word *plan* in its scientific sense. Both were definite and systematic organizations of society. The first and most ancient was a *social organization*, founded upon gentes, phratries and tribes. The second and latest in time was a *political organization*, founded upon territory and upon property. Under the first a gentile society was created, in which the government dealt with persons through their relations to a gens and tribe. These relations were purely personal. Under the second a political society was instituted, in which the government dealt with persons through their relations to territory, *e. g.*—the township, the county, and the state. These relations were purely territorial. The two plans were fundamentally different. One belongs to ancient society, and the other to modern.

The gentile organization opens to us one of the oldest and most widely prevalent institutions of mankind. It furnished the nearly universal plan of government of ancient society, Asiatic, European, African and Australian. It was the instrumentality by means of which society was organized and held together. Commencing in savagery, and continuing through the three sub-periods of barbarism, it remained until the establishment of political society, which did not occur until after civilization had commenced. The Grecian gens, phratry and tribe, the Roman gens, *curia* and tribe find their analogues in the gens, phratry and tribe of the American aborigines. In like manner, the Irish *sept*, the Scottish *clan*, the *phrara* of the Albanians, and the Sanskrit *ganas*, without extending the comparison further, are the same as the American Indian gens, which has usually been called a clan. As far as our knowledge extends, this organization runs through the entire ancient world upon all the continents, and it was brought down to the historical period by such tribes as attained to civilization. Nor is this all. Gentile society wherever found is the same in structural organization and in principles of action; but changing from lower to higher forms with the progressive advancement of the people. These changes give the history of development of the same original conceptions.

Gens, *genos*, and *ganas* in Latin, Greek and Sanskrit have alike the primary signification of *kin*. They contain the same element as *gigno*, *gignomai*, and *ganamai*, in the same languages, signifying *to beget*; thus implying in each an

¹From Lewis H. Morgan, *Ancient Society*, part II, chapter 2.

immediate common descent of the members of a gens. A gens, therefore, is a body of consanguinei descended from the same common ancestor, distinguished by a gentile name, and bound together by affinities of blood. It includes a moiety only of such descendants. Where descent is in the female line . . . the gens is composed of a supposed female ancestor and her children, together with the children of her female descendants, through females, in perpetuity; and where descent is in the male line, . . . of a supposed male ancestor and his children, together with the children of his male descendants, through males in perpetuity. . . .

The gentile organization, originating in the period of savagery, . . . finally gave way, among the more advanced tribes, when they attained civilization, the requirements of which it was unable to meet. Among the Greeks and Romans, political society supervened upon gentile society, but not until civilization had commenced. The township (and its equivalent, the city ward), with its fixed property, and the inhabitants it contained, organized as a body politic, became the unit and the basis of a new and radically different system of government. After political society was instituted, this ancient and time-honored organization, with the phratry and tribe development from it, gradually yielded up their existence. . . .

The plan of government of the American aborigines commenced with the gens and ended with the confederacy, the latter being the highest point to which their governmental institutions attained. It gave for the organic series: first, the gens, a body of consanguinei having a common gentile name; second, the phratry, an assemblage of related gentes united in a higher association for certain common objects; third, the tribe, an assemblage of gentes, usually organized in phratries, all the members of which spoke the same dialect; and fourth, a confederacy of tribes, the members of which respectively spoke dialects of the same stock language. It resulted in a gentile society (*societas*), as distinguished from a political society or state (*civitas*). The difference between the two is wide and fundamental. There was neither a political society, nor a citizen, nor a state, nor any civilization in America when it was discovered. . . .

From lapse of time the Iroquois tribes have come to differ slightly in the number, and in the names of their respective gentes. The largest number being eight, as follows:

Senecas.—1. Wolf. 2. Bear. 3. Turtle. 4. Beaver. 5. Deer. 6. Snipe. 7. Heron. 8. Hawk.

Cayugas.—1. Wolf. 2. Bear. 3. Turtle. 4. Beaver. 5. Deer. 6. Snipe. 7. Eel. 8. Hawk.

Onondagas.—1. Wolf. 2. Bear. 3. Turtle. 4. Beaver. 5. Deer. 6. Snipe. 7. Eel. 8. Ball.

Oneidas.—1. Wolf. 2. Bear. 3. Turtle.

Mohawks.—1. Wolf. 2. Bear. 3. Turtle.

Tuscaroras.—1. Gray Wolf. 2. Bear. 3. Great Turtle. 4. Beaver. 5. Yellow Wolf. 6. Snipe. 7. Eel. 8. Little Turtle.

These changes show that certain gentes in some of the tribes have become extinct through the vicissitudes of time; and that others have been formed by the segmentation of over-full gentes.

With a knowledge of the rights, privileges and obligations of the members of a gens, its capabilities as the unit of a social and governmental system will be more fully understood, as well as the manner in which it entered into the higher organizations of the phratry, tribe, and confederacy.

The gens is individualized by the following rights, privileges, and obligations conferred and imposed upon its members, and which made up the *jus gentilicium*:

- I. *The right of electing its sachem and chiefs.*
- II. *The right of deposing its sachem and chiefs.*
- III. *The obligation not to marry in the gens.*
- IV. *Mutual rights of inheritance of the property of deceased members.*
- V. *Reciprocal obligations of help, defense, and redress of injuries.*
- VI. *The right of bestowing names upon its members.*
- VII. *The right of adopting strangers into the gens.*
- VIII. *Common religious rites, query.*
- IX. *A common burial place.*
- X. *A council of the gens.*

These functions and attributes gave vitality as well as individuality to the organization, and protected the personal rights of its members.

- I. *The right of electing the sachem and chiefs.*

Nearly all the American Indian tribes had two grades of chiefs, who may be distinguished as sachems and common chiefs. Of these two primary grades all other grades were varieties. They were elected in each gens from among its members. A son could not be chosen to succeed his father, where descent was in the female line, because he belonged to a different gens, and no gens would have a chief or sachem from any gens but its own. The office of sachem was hereditary in the gens, in the sense that it was filled as often as a vacancy occurred; while the office of chief was non-hereditary, because it was bestowed in reward of personal merit, and died with the individual. Moreover, the duties of a sachem were confined to the affairs of peace. He could not go out to war as a sachem. On the other hand, the chiefs who were raised to office for personal bravery, for wisdom in affairs, or for eloquence in council, were usually the superior class in ability, though not in authority over the gens. The relation of the sachem was primarily to the gens, of which he was the official head; while that of the chief was primarily to the tribe, of the council of which he, as well as the sachem, were members. . . .

While the office [of sachem] was hereditary in the gens it was elective among its male members. When the Indian system of consanguinity is considered,

it will be found that all the male members of a gens were either brothers to each other, own or collateral, uncles or nephews, own or collateral, or collateral grandfathers and grandsons. This will explain the succession of the office of sachem which passed from brother to brother, or from uncle to nephew, and very rarely from grandfather to grandson. The choice, which was by free suffrage of both males and females of adult age, usually fell upon a brother of the deceased sachem, or upon one of the sons of a sister; an own brother, or the son of an own sister being most likely to be preferred. As between several brothers, own and collateral, on the one hand, and the sons of several sisters, own and collateral, on the other, there was no priority of right, for the reason that all the male members of the gens were equally eligible. To make a choice between them was the function of the elective principle.

Upon the death of a sachem, for example among the Seneca-Iroquois, a council of his gentiles was convened to name his successor. Two candidates, according to their usages, must be voted upon, both of them members of the gens. Each person of adult age was called upon to express his or her preference, and the one who received the largest number of affirmative declarations was nominated. It still required the assent of the seven remaining gentes before the nomination was complete. If these gentes, who met for the purpose by phratries, refused to confirm the nomination it was thereby set aside, and the gens proceeded to make another choice. When the person nominated by his gens was accepted by the remaining gentes the election was complete; but it was still necessary that the new sachem should be *raised up*, to use their expression, or invested with his office by a council of the confederacy, before he could enter upon its duties. It was their method of conferring the *imperium*. In this manner the rights and interests of the several gentes were consulted and preserved; for the sachem of a gens was *ex officio* a member of the council of the tribe, and of the higher council of the confederacy. The same method of election and of confirmation existed with respect to the office of chief, and for the same reasons. But a general council was never convened to raise up chiefs below the grade of a sachem. They awaited the time when sachems were invested.

The principle of democracy, which was born of the gentes, manifested itself in the retention by the gentiles of the right to elect their sachem and chiefs, in the safeguards thrown around the office to prevent usurpation, and in the check upon the election held by the remaining gentes. . . .

II. *The right of deposing its sachem and chiefs.*

This right, which was not less important than that to elect, was reserved by the members of the gens. Although the office was nominally for life, the tenure was practically during good behavior, in consequence of the power to depose. The installation of a sachem was symbolized as "putting on the horns," and his deposition was "taking off the horns." Among widely separated tribes of mankind horns have been made the emblem of office and of authority, suggested probably, as Tylor intimates, by the commanding appearance

of the males among ruminant animals bearing horns. Unworthy behavior, followed by a loss of confidence, furnished a sufficient ground for deposition. When a sachem or chief had been deposed in due form by a council of his gens, he ceased thereafter to be recognized as such, and became thenceforth a private person. The council of the tribe also had power to depose both sachems and chiefs, without waiting for the action of the gens, and even against its wishes. Through the existence and occasional exercise of this power the supremacy of the gentiles over their sachem and the chiefs was asserted and preserved. It also reveals the democratic constitution of the gens.

III. *The obligation not to marry in the gens.*

Although a negative proposition it was fundamental. It was evidently a primary object of the organization to isolate a moiety of the descendants of a supposed founder, and prevent their intermarriage for reasons of kin. . . . The Iroquois still adhere inflexibly to the rule which forbids persons to marry in their own gens.

IV. *Mutual rights of inheritance of the property of deceased members.*

In the status of savagery and barbarism, the amount of property was small. It consisted in the former condition of personal effects, to which, in the latter, were added possessory rights in joint-tenement houses and in gardens. The most valuable personal articles were buried with the body of the deceased owner. Nevertheless, the question of inheritance was certain to arise, to increase in importance with the increase of property in variety and amount, and to result in some settled rule of inheritance. Accordingly we find the principle established low down in barbarism, and even back of that in savagery, that the property should remain in the gens, and be distributed among the gentiles of the deceased owner. . . .

Practically, the effects of a deceased person were appropriated by his nearest relations within the gens. In the case of a male his own brothers and sisters and maternal uncles divided his effects among themselves. This practical limitation of the inheritance to the nearest gentile kin discloses the germ of agnatic inheritance. In the case of a female her property was inherited by her children and her sisters, to the exclusion of her brothers. In every case the property remained in the gens. The children of the deceased males took nothing from their father because they belonged to a different gens. It was for the same reason that the husband took nothing from the wife, or the wife from her husband. These mutual rights of inheritance strengthened the autonomy of the gens.

V. *Reciprocal obligations of help, defense, and redress of injuries.*

In civilized society the state assumes the protection of persons and of property. Accustomed to look to this source for the maintenance of personal rights, there has been a corresponding abatement of the strength of the bond of kin. But under gentile society the individual depended for security upon his gens. It took the place afterwards held by the state, and possessed the

requisite numbers to render its guardianship effective. Within its membership the bond of kin was a powerful element for mutual support. To wrong a person was to wrong his gens; and to support a person was to stand behind him with the entire array of his gentile kindred. . . .

VI. *The right of bestowing names upon its members.*

Among savage and barbarous tribes there is no name for the family. The personal names of individuals of the same family do not indicate any family connection between them. The family name is no older than civilization. Indian personal names, however, usually indicate the gens of the individual to persons of other gentes in the same tribe. As a rule each gens had names for persons that were its special property, and, as such, could not be used by other gentes of the same tribe. A gentile name conferred of itself gentile rights. These names either proclaimed by their signification the gens to which they belonged, or were known as such by common reputation.

After the birth of a child a name was selected by its mother from those not in use belonging to the gens, with the concurrence of her nearest relatives, which was then bestowed upon the infant. But the child was not fully christened until its birth and name, together with the name and gens of its mother and the name of its father, had been announced at the next ensuing council of the tribe. Upon the death of a person his name could not be used again in the life-time of the oldest surviving son without the consent of the latter.

Two classes of names were in use, one adapted to childhood, and the other to adult life, which were exchanged at the proper period in the same formal manner; one being taken away, to use their expression, and the other bestowed in its place. *O-wi'-go*, a canoe floating down the stream, and *h-wou'-ne-ont*, hanging flower; are names for girls among the Seneca-Iroquois; and *Gä-ne-o-di'-yo*, handsome lake, and *Do-ne-ho-gä'-weh*, door-keeper, are names of adult males. At the age of sixteen or eighteen, the first name was taken away, usually by a chief of the gens, and one of the second class bestowed in its place. At the next council of the tribe the change of names was publicly announced, after which the person, if a male, assumed the duties of manhood. In some Indian tribes the youth was required to go out upon the war-path and earn his second name by some act of personal bravery. After a severe illness it was not uncommon for the person, from superstitious considerations, to solicit and obtain a second change of name. It was sometimes done again in extreme old age. When a person was elected a sachem or a chief his name was taken away, and a new one conferred at the time of his installation. The individual had no control over the question of a change. It is the prerogative of the female relatives and of the chiefs; but an adult person might change his name provided he could induce a chief to announce it in council. A person having the control of a particular name, as the eldest son of that of his deceased father, might lend it to a friend in another gens; but after the death of the person thus bearing it the name reverted to the gens to which it belonged. . . .

VII. *The right of adopting strangers into the gens.*

Another distinctive right of the gens was that of admitting new members by adoption. Captives taken in war were either put to death, or adopted into some gens. Women and children taken prisoners usually experienced clemency in this form. Adoption not only conferred gentile rights, but also the nationality of the tribe. The person adopting a captive placed him or her in the relation of a brother or sister; if a mother adopted, in that of a son or daughter; and ever afterwards treated the person in all respects as though born in that relation. . . . Captives when adopted were often assigned in the family the places of deceased persons slain in battle, in order to fill up the broken ranks of relatives. A declining gens might replenish its numbers, through adoption, although such instances are rare. At one time the Hawk gens of the Senecas were reduced to a small number of persons, and its extinction became imminent. To save the gens a number of persons from the Wolf gens by mutual consent were transferred in a body by adoption to that of the Hawk. The right to adopt seems to be left to the discretion of each gens.

Among the Iroquois the ceremony of adoption was performed at a public council of the tribe, which turned it practically into a religious rite.

VIII. *Religious rites in the gens. Query. . .*

IX. *A common burial place.*

An ancient but not exclusive mode of burial was by scaffolding the body until the flesh had wasted, after which the bones were collected and preserved in bark barrels in a house constructed for their reception. Those belonging to the same gens were usually placed in the same house. . . .

Among the Iroquois, and what is true of them is generally true of other Indian tribes in the same status of advancement, all the members of the gens are mourners at the funeral of a deceased gentilis. The addresses at the funeral, the preparation of the grave, and the burial of the body were performed by members of other gentes. . . .

X. *A council of the gens.*

The council was the great feature of ancient society, Asiatic, European and American, from the institution of the gens in savagery to civilization. It was the instrument of government as well as the supreme authority over the gens, the tribe, and the confederacy. Ordinary affairs were adjusted by the chiefs; but those of general interest were submitted to the determination of a council. As the council sprang from the gentile organization the two institutions have come down together through the ages. The Council of Chiefs represents the ancient method of evolving the wisdom of mankind and applying it to human affairs. Its history, gentile, tribal, and confederate, would express the growth of the idea of government in its whole development, until political society supervened into which the council, changed into a senate, was transmitted.

The simplest and lowest form of the council was that of the gens. It was a democratic assembly because every adult male and female member had a voice upon all questions brought before it. It elected and deposed its sachem and chiefs, it elected Keepers of the Faith, it condoned or avenged the murder of a gentilis, and it adopted persons into the gens. It was the germ of the higher council of the tribe, and of that still higher of the confederacy, each of which was composed exclusively of chiefs as representatives of the gentes. . . .

These facts are material, because the gens was the unit of a social and governmental system, the foundation upon which Indian society was organized.

35. THE GENTILE SYSTEM OF THE OMAHA¹

By J. OWEN DORSEY

Tribal Circles

In former days, whenever a large camping-ground could not be found, the Ponkas used to encamp in three concentric circles; while the Omahas, who were a smaller tribe, pitched their tents in two similar circles. This custom gave rise to the name "Oyate yamni," The Three Nations, as the Ponkas were styled by the Dakotas, and the Omahas became known as the Two Nations. But the usual order of encampment has been to pitch all the tents in one large circle or horseshoe, called "hudhuga" by the Indians. In this circle the gentes took their regular places, disregarding their gentile circles, and pitching the tents, one after another, within the area necessary for each gens. This circle was not made by measurement, nor did any one give directions where each tent should be placed; that was left to the women.

When the people built a village of earth-lodges, and dwelt in it, they did not observe this order of camping. Each man caused his lodge to be built wherever he wished to have it, generally near those of his kindred. But whenever the whole tribe migrated with the skin tents, as when they went after the buffaloes, they observed this order.

Sometimes the tribe divided into two parties, some going in one direction, some in another. On such occasions the regular order of camping was not observed; each man encamped near his kindred, whether they were maternal or paternal consanguinities.

The crier used to tell the people to what place they were to go, and when they reached it the women began to pitch the tents.

The Omaha Tribal Circle

The road along which they passed divided the tribal circle into two equal parts; five gentes camped on the right of it and five pitched their tents on its left. Those on the right were called the Hañgacenu and the others were known as the Ictasanda. The Hañgacenu gentes are as follows: Weji²cte, Iñke-sabě, Hañga, Dhatada, and Ka²ze. The Ictasanda gentes are as follows: Ma²dhiñka-gaxe, Te-sinde, Ta-pa, Inghde-jide, and Ictasanda.

¹From Chapter 3 of J. Owen Dorsey, "Omaha Sociology," *Third Annual Report of the Bureau of American Ethnology*, pages 205-370, 1884.

According to Wahaⁿ'dhiñge, the chief of the Te-sinde gens, there used to be one hundred and thirty-three tents pitched by the Hañgacenu, and one hundred and forty-seven by the Ictasanda. This was probably the case when they went on the hunt the last time, in 1871 or 1872.

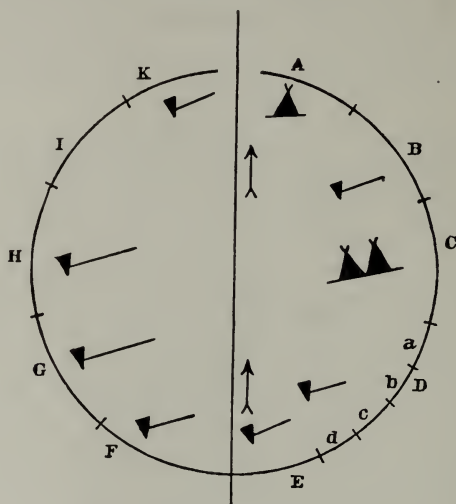


Fig. 1. The Omaha tribal circle.

Legend

Hañgacenu Gentes

- A. Wejiⁿcte, or Elk.
- B. Iñke-sabe.
- C. Hañga.
- D. Dhatada:
 - a. Wasabe-hit'aji.
 - b. Wajiñga-dhataji.
 - c. Te-da-it'aji.
 - d. Ke-'iⁿ.
- E. Kaⁿze.

Ictasanda Gentes

- F. Maⁿdhiñka-gaxe.
- G. Te-sinde.
- H. Ta-pa.
- I. Iñdghe-jide.
- K. Ictasanda.

The sacred tents of the Wejiⁿcte and Hañga gentes are designated by appropriate figures; so also are the seven gentes which keep the sacred pipes. The diameter of the circle represents the road traveled by the tribe, A and K forming the gentes in the van.

Rules for Pitching the Tents

Though they did not measure the distances, each woman knew where to pitch her tent. Thus a Ka^{ze} woman who saw a Weji^{cte} tent set up, knew that her tent must be pitched at a certain distance from that part of the circle, and at or near the opposite end of the road or diameter of the circle. When two tents were pitched too far apart one woman said to the other, "Pitch the tent a little closer." Or, if they were too close, she said, "Pitch the tent further away." So also if the tents of neighboring gentes were too far apart or too close together. In the first case the women of one gens might say, "Move along a little, and give us more room." In the other they might say, "Come back a little, as there is too much space between us." When the end gentes, Weji^{cte} and Ictasanda, were too far apart there was sometimes danger of attacks of enemies. On one occasion the Dakotas made a dash into the very midst of the circle and did much damage, because the space between these two gentes was too great. But at other times, when there is no fear of an attack, and when the women wish to dress hides, etc., the crier says: "Halloo! Make ye them over a large tract of land." This is the only occasion when the command is given *how* to pitch the tents.

When the tribe returned from the hunt the gentes encamped in reverse order, the Weji^{cte} and Ictasanda gentes having their tents at the end of the circle nearest home. . . .

Within the circle were placed the horses, as a precaution against attacks from enemies. When a man had many horses and wished to have them near him, he generally camped within the circle, apart from his gens, but this custom was of modern origin, and was the exception to the rule.

The Sacred Tents

The three sacred tents were pitched within the circle and near their respective gentes: that of the Weji^{cte} is the war tent, and it was placed not more than fifty yards from its gens; those of the Haña gens are connected with the regulation of the buffalo hunt, etc.; or, we may say that the former had to do with the protection of life and the latter with the sustenance of life, as they used to depend mainly on the hunt for food, clothing, and means of shelter. . . .

Law of Membership

A child belongs to its father's gens, as "father-right" has succeeded "mother-right." But children of white or black men are assigned to the gentes of their mothers, and they cannot marry any woman of those gentes. A stranger cannot belong to any gens of the tribe, there being no ceremony of adoption into a gens.

The Weji^acte or Elk Gens

This gens occupies the first place in the tribal circles, pitching its tents at one of the horns or extremities, not far from the Ictasanda gens, which camps at the other end. . . .

Taboo.—The members of this gens are afraid to touch any part of the male elk, or to eat its flesh; and they cannot eat the flesh of the male deer. Should they accidentally violate this custom they say that they are sure to break out in boils and white spots on different parts of the body. But when a member of this gens dies he is buried in moccasins made of deer skin. . . .

The Sacred Tent.—The sacred tent of the Elk gens is consecrated to war, and scalps are given to it, but are not fastened to it, as some have asserted. Bdha^ati used to be the keeper of it, but he has resigned the charge of it to the ex-chief, Mahiⁿdhiñge.

The place of this sacred tent is within the tribal circle, and near the camping place of the gens. This tent contains one of the wadhixabe, a sacred bag, made of the feathers and skin of a bird, and consecrated to war. There is also another sacred bag in this tent, that which holds the sacred tihaba or clam shell, the bladder of a male elk filled with tobacco, and the sacred pipe of the gens, the tribal war-pipe, which is made of red pipe-stone. . . .

Worship of the thunder in the spring.—When the first thunder is heard in the spring of the year the Elk people call to their servants, the Bear people, who proceed to the sacred tent of the Elk gens. When the Bear people arrive one of them opens the sacred bag, and, after removing the sacred pipe, hands it to one of the Elk men, with some of the tobacco from the elk bladder. Before the pipe is smoked it is held toward the sky and the thunder god is addressed. . . .

While the Elk gens is associated with the warpath, and the worship of the thunder god, who is invoked by war chiefs, those war chiefs are not always members of this gens, but when the warriors return, the keeper of the sacred bag of this gens compels them to speak the truth about their deeds.

Birth names of boys.—The following are the birth names of boys in the Elk gens. These are sacred or nokie names, and sons used to be so named in former days, according to the order of their births. For example, the first-born son was called the Soft Horn (of the young elk at its first appearance). The second, Yellow Horn (of the young elk when a little older). The next, the Branching Horns (of an elk three years old). The fourth, the Four Horns (of an elk four year old). The fifth, the Large Pronged Horns (of an elk six or seven years old). The sixth, the Dark Horns (of a grown elk in summer). The seventh, the Standing White Horns, in the distance (i.e., those of a grown elk in winter).

Other proper names.—The following are the other nikié² names of the elk gens: Elk. Young Elk. Standing Elk. White Elk (near by). Big Elk. . . . (Elk) Turns round and round. No Knife or No Stone (probably referring to the tradition of the discovery of four kinds of stone). Dark Breast (of an elk). Deer lifts its head to browse. Yellow Rump (of an elk). Walking Full-grown Elk. (Elk) Walks, making long strides, swaying from side to side. Stumpy Tail (of an elk). . . .

The Iñke-sabě, or Black Shoulder Gens

This is a Buffalo gens, and its place in the tribal circle is next to that of the Elk gens. . . .

Mythical origin.—The Iñke-sabě were buffaloes, and dwelt under the surface of the water. When they came to the surface they jumped about in the water, making it muddy; hence the birth-name for the first son, Ni-gaqude. Having reached the land they snuffed at the four winds and prayed to them. The north and west winds were good, but the south and east winds were bad.

Ceremony at the death of a member of the gens.—In former days, when any member of the gens was near death, he was wrapped in a buffalo robe, with the hair out, and his face was painted with the privileged decorations. Then the dying person was addressed thus: "You are going to the animals (the buffaloes). You are going to rejoin your ancestors. (Anita dubaha hne. Wackañ-gă, i.e.) You are going, or, Your four souls are going, to the four winds. Be strong!" All the members of this gens, whether male or female, were thus attired and spoken to when they were dying. . . .

²Nikié names are those referring to a mythical ancestor, to some part of his body, to some of his acts, or to some ancient rite which may have been established by him. Nikié names are of several kinds. (a.) The seven birth names for each sex. (b.) Other nikié names, not birth names, but peculiar to a single gens. (c.) Names common to two or more gentes. There are two explanations of the last case. All the gentes using the same name may have had a common mythical ancestor or a mythical ancestor of the same species or genus. Among the Osages and Kansas there are gentes that exchange names; and it is probable that the custom has existed among the Omahas. Some of these gentes that exchange names are those which have the same sacred songs.

The following law about nikié names has been observed by the Omahas:

There must never be more than one person in a gens bearing any particular male name. For instance, when, in any household, a child is named Wasabe-jĩnga, that name cannot be given to any new-born child of that gens. But when the first bearer of the name changes his name or dies, another boy can receive the name Wasabe-jĩnga. As that is one of the seven birth names of the Wasabe-hit'aji it suggests a reason for having extra nikié names in the gens. This second kind of nikié names may have been birth names, resorted to because the original birth names were already used. This law applies in some degree to girls' names: if parents know that a girl in the gens has a certain name they cannot give that name to their daughter. But should that name be chosen through ignorance, the two girls must be distinguished by adding to their own names those of their respective fathers.

Iñke-sabě style of wearing the hair.—The smaller boys have their hair cut in this style. A A, the horns of the buffalo, being two locks of hair about two inches long. B is a fringe of hair all around the head. It is about two inches long. The rest of the head is shaved bare. . . .

The Hañga Gens

Hañga seems to mean, "foremost," or "ancestral." Among the Omahas this gens is a buffalo gens; but among the Kansas and Osages it refers to other gentes. In the Omaha tribal circle, the Hañga people camp next to the Iñke-sabě. . . .

Mythical origin of the gens.—According to Yellow Smoke, the first Hañga people were buffaloes and dwelt beneath the water. When they were there they used to move along with their heads bowed and their eyes closed. By and by they opened their eyes in the water; hence their first birth-name, Niahi-icta-ugabdha. Emerging from the water, they lifted their heads and saw the blue sky for the first time. So they assumed the name of Kedha-gaxe, or "Clear sky makers." . . .

The sacred tents.—There are two sacred tents belonging to this gens. When the tribal circle is formed these are pitched within it, about fifty yards from the tents of the gens. Hence the proper name, Udhuci-naji^a. A straight line drawn from one to the other would bisect the road of the tribe at right angles.

The sacred tents are always together. They pertain to the buffalo hunt, and are also "wewaspe," having a share in the regulative system of the tribe, as they contain two objects which have been regarded as "Wakañda ega^a," partaking of the nature of deities. These objects are the sacred pole or "waqdhexe," and the "te-sa^a-ha." . . .

Tradition of the sacred pole.—The "waqdhexe," "ja^awaqube," or sacred pole, is very old, having been cut more than two hundred years ago, before the separation of the Omahas, Ponkas, and Iowas. The Ponkas still claim a share in it, and have a tradition about it. . . . The Omahas tell the following:

At the first there were no chiefs in the gentes, and the people did not prosper. So a council was held, and they asked one another, "What shall we do to improve our condition?" Then the young men were sent out. They found many cotton-wood trees beside a lake, but one of these was better than the rest. They returned and reported the tree, speaking of it as if it was a person. All rushed to the attack. They struck it and felled it as if it had been a foe. They then put hair on its head, making a person of it. Then were the sacred tents made, the first chiefs were selected, and the sacred pipes were distributed.

The sacred pole was originally longer than it is now, but the lower part having worn out, a piece of ash-wood, about eighteen inches long, has been fastened to the cotton-wood with a soft piece of cord made of a buffalo hide. The ash-wood forms the bottom of the pole, and is the part which is stuck in the ground at certain times. The cotton-wood is about eight feet long. . . .

The other sacred tent . . . contains the sacred "te-saⁿ-ha," the skin of a white buffalo cow, wrapped in a buffalo hide that is without hair. . . .

Subgentes.—There are two great divisions of the gens, answering to the number of the sacred tents: The Keepers of the Sacred Pole and The Keepers of the Te-saⁿ-ha. Some said that there were originally four subgentes, but two have become altogether or nearly extinct, and the few survivors have joined the larger subgentes. . . .

Style of wearing the hair.—The Hañga style of wearing the hair is called "te-nañ.ka-baxe," referring originally to the back of a buffalo. It is a crest of hair, about 2 inches long, standing erect, and extending from one ear to the other. The ends of the hair are a little below the ears. . . .

The Dhatada Gens

This gens occupies the fourth place in the tribal circle, being between the Hañga and the Kaⁿze. But, unlike the other gentes, its subgentes have separate camping areas. Were it not for the marriage law, we should say that the Dhatada was a phratry, and its subgentes were gentes. . . . When on the hunt the four subgentes pitch their tents in the following order in the tribal circle: 1. Wasabe-hit'aji; 2. Wajiñga dhataji; 3. Te-da-it'aji; 4. Ke-'iⁿ. . . .

The Wasabe-hit'aji Subgens

The name of this subgens is derived from three words: wasabe, *a black bear*; ha, *a skin*; and it'aji, *not to touch*; meaning "Those who do not touch the skin of a black bear." . . .

Taboo.—The members of this subgens are prohibited from touching the hide of a black bear and from eating its flesh. . . .

Birth-names of boys.—Padhiⁿ-naⁿpaji gave the following: The first son is called Young Black bear. The second, Black bear. The third, Four Eyes, including the true eyes and the two spots like eyes that are above the eyes of a black bear. The fourth, Gray Foot. The fifth, Cries like a Raccoon. (La Flèche said that this is a Ponka name, but the Omahas now have it.) The sixth Nidahaⁿ, Progressing toward maturity (*sic*). The seventh, He turns round and round suddenly (said of both kinds of bears). . . .

The Wajiñga Dhataji Subgens

This name means, "They who do not eat (small) birds." They can eat wild turkeys, all birds of the miⁿxa or goose genus, including ducks and cranes. When sick, they are allowed to eat prairie chickens. When members of this subgens go on the warpath, the only sacred things which they have are the gdhedan (hawk) and nickucku (martin).

Style of wearing the hair.—They leave a little hair in front, over the forehead, for a bill, and some at the back of the head, for the bird's tail, with much over each ear, for the wings. . . .

Custom during harvest.—These Wajiŋga-dhatajī call themselves "The Blackbird people." In harvest time, when the birds used to eat the corn, the men of this subgens proceeded thus: They took some corn, which they chewed and spit around over the field. They thought that such a procedure would deter the birds from making further inroads upon the crops. . . .

The Te-pa-it'aji Subgens

These are the Eagle people, and they are not allowed to touch a buffalo head. . . .

Birth names of boys.—The first was called Dried Eagle. Padhiⁿ-naⁿpajī said that his really meant "Dried buffalo skull"; but La Flèche and Two Crows denied this, giving another meaning, "Dried Eagle skin." The second was Pipe. The third, Eaglet. The fourth, Real Bald Eagle. The sixth, Standing Bald Eagle. The seventh, He (an eagle) makes the ground Shake suddenly by Alighting on it. . . .

The Ke-'iⁿ, or Turtle Subgens

This subgens camps between the Te-da-it'aji and the Kaⁿze, in the tribal circle Ke'ⁱn means "to carry a turtle on one's back." The members of this subgens are allowed to touch or carry a turtle, but they cannot eat one.

Style of wearing the hair.—They cut off all the hair from a boy's head, except six locks; two are left on each side, one over the forehead, and one hanging down the back, in imitation of the legs, head, and tail of a turtle. La Flèche and Two Crows did not know about this, but they said that it might be true.

Decoration of the tents.—The figures of turtles were painted on the outside of the tents.

Custom during a fog.—In the time of a fog the men of this subgens drew the figure of a turtle on the ground with its face to the south. On the head, tail, middle of the back, and on each leg were placed small pieces of a (red) breech-cloth with some tobacco. This they imagined would make the fog disappear very soon.

Birth-names of boys.—The first son was called He who Passed by here on his way back to the Water; the second, He who runs very swiftly to get back to the Water; the third, He who floats down the stream; the fourth, Red Breast; the fifth, Big Turtle; the sixth, Young one who carries a turtle on his back; the seventh, Turtle that kicks out his legs and paws the ground when a person takes hold of him. . . .

The Kaⁿze Gens

The place of the Kaⁿze or Kansas gens is between the Ke'iⁿ and the Maⁿdhiñka-gaxe in the tribal circle. . . . The Kaⁿze people cannot touch verdigris, which they call "wase-tu," green clay, or "wase-tu-qude," gray-green clay.

Being Wind people, they flap their blankets to start a breeze which will drive off the mosquitoes. . . .

The Maⁿdhiñka-gaxe Gens

This gens, which is the first of the Ictasanda gentes, camps next to the Kaⁿze, but on the opposite side of the road. . . . The name Maⁿdhiñka-gaxe means "the earth-lodge makers," but the members of this gens call themselves the Wolf (and Prairie Wolf) People. The principal nikié of the Maⁿdhiñka-gaxe are the coyote, the wolf, and the sacred stones. . . .

The Te-sínde Gens

The Te-sínde, or Buffalo-tail gens, camps between the Maⁿdhiñka-gaxe and the Ta-pa gentes in the tribal circle. . . .

Taboos.—The members of this gens cannot eat a calf while it is red, but they can do so when it becomes black. This applies to the calf of the domestic cow, as well as to that of the buffalo. They cannot touch a buffalo head. . . . They cannot eat the meat of the lowest rib, tedhitucagdhe, because the head of the calf before birth touches the mother near that rib. . . .

The Ta-pa or Deer-head Gens

The place of this gens in the tribal circle is after that of the Te-sínde. . . .

Taboo.—The members of this gens cannot touch the skin of any animal of the deer family; they cannot use moccasins of deer-skin; nor can they use the fat of the deer for hair-oil as the other Omahas can do; but they can eat the flesh of the deer. . . .

The Iñgdhe-jide Gens

Taboo.—They do not eat a buffalo calf. (See Te-sínde gens.) It appears that the two Ictasanda buffalo gentes are buffalo calf gentes, and that the two Hañgacenu buffalo gentes are connected with the grown buffalo. . . .

The Ictasanda Gens

The meaning of "Ictasanda" is uncertain; though Say was told by Dougherty that it signifies "gray eyes." It probably has some reference to the effect of lightning on the eyes. The place of the Ictasanda is at the end of the tribal circle, after the Iñgdhe-jide, and opposite to the Wejiⁿete. . . .

Taboo.—The Ictasanda people do not touch worms, snakes, toads, frogs, or any other kinds of reptiles. Hence they are sometimes called the "Wagdhicka nikaciⁿga," or Reptile people. But there are occasions when they seem to violate this custom. If worms trouble the corn after it has been planted, these people catch some of them. They pound them up with a small quantity of grains of corn that have been heated. They make a soup of the mixture and eat it, thinking that the corn will not be troubled again—at least for the remainder of that season.

36. MIWOK MOIETIES¹

By EDWARD WINSLOW GIFFORD

INTRODUCTION

The Miwok Indians of the Sierra Nevada of California are divided by anthropologists into three dialectic groups, termed Northern or Amador, Central or Tuolumne, and Southern or Mariposa. These three groups occupy the western slope of the mountains from El Dorado County in the north to Madera County in the south. Their social organization takes the form of totemic exogamic moieties with paternal descent. . . .

MOIETIES

As already related, the Central Sierra Miwok are divided into exogamic moieties with paternal descent, usually spoken of as *kikua* (water side) and *tunuka* (land, or dry, side). Frequently the former are referred to as "bull-frog people" (*lotasuna*) and the latter as "bluejay people" (*kosituna*). The presence of two exogamic divisions with animal nicknames has at least a superficial analogy to a case mentioned by Dr. W. H. R. Rivers as occurring on the island of Raga or Pentecost in the northern New Hebrides.

With the Miwok the moiety has no subdivisions. At first glance the fact that 16 per cent. of the Central Sierra Miwok are named after bears, and the remainder after numerous other animate and inanimate objects and phenomena, would seem to suggest a phratral system, with numerous totemic gentes, gone into decay. The Indians, nevertheless, positively deny the existence of smaller divisions. They in no way regard the people with bear names, for example, as forming a special group. Nothing in the information obtained points to a phratral system ever having been in operation. . . .

EXOGAMY

The exogamic rules of the moieties were not rigidly adhered to even before the coming of the whites. Out of a series of four hundred and thirteen individuals, whose names were obtained, one hundred and eighty-four, or 45 per cent., belonged to the water moiety, and two hundred and twenty-nine, or

¹From Edward Winslow Gifford, "Miwok Moieties," *University of California Publications in American Archaeology and Ethnology*, volume 12, pages 139-194, Berkeley, 1916.

55 per cent., to the land moiety. The greater number of these four hundred and thirteen individuals were either of the generation of the oldest Indians of today or of the preceding generation. Had the exogamic rules been strictly enforced it would have meant that ten people out of every hundred went unmarried or else married late in life. The natural result of this preponderance of one moiety over the other would be the breaking down of strict exogamy in actual practice, especially in a case like the present, where the system lacks the rigidity of the Australian marriage-class system. Informants stated that strenuous efforts were never made to prevent improper marriages. The relatives merely objected and pointed out the impropriety of such marriages. Under the heading "Marriages" are listed the recorded Miwok marriages, of which actually 25 per cent. are improper.

The figures in the last paragraph show the division into moieties of the Central Sierra Miwok as a whole, at least so far as the data go. A list of the inhabitants of only one village was obtained. This village was located on Big Creek near Groveland. The total number of individuals listed is one hundred and two and includes people of all generations within the knowledge of the informant. Out of this total, 56 per cent. belonged to the water moiety and 44 per cent. to the land moiety. This is the reverse of the situation among the Central Sierra Miwok exclusive of the Big Creek people. A table will perhaps make the situation clearer.

	Percentage of water moiety	Percentage of land moiety
Central Sierra Miwok in general.....	45	55
Village at Big Creek.....	56	44
Central Sierra Miwok, except Big Creek people.....	41	59

Unfortunately no other village censuses have been taken, so that in comparing the Big Creek people with the remainder of the Central Sierra Miwok we are comparing with a very miscellaneous and scattered lot of individuals. Roughly stated, however, they may be said to be mainly Jamestown and Knights Ferry people. At Big Creek twelve people out of a hundred were ineligible for monogamic marriage within the village, if strict exogamy were enforced. In the region outside of Big Creek, however, eighteen people out of a hundred were ineligible.

TOTEMISM

That totemic symptoms of one sort or another are present in the Miwok organization cannot be denied; yet, on the other hand, it must be acknowledged that the classing of the Miwok with totemic peoples is based on a rather weak foundation. The claims for such classification rest on three well established facts.

First, all nature is divided between land and water, in a more or less arbitrary manner, to be sure, as shown by the classing of such animals as the coyote, deer, and quail on the "water" side.

Second, the exogamic moieties are identified respectively with land and water.

Third, an intimate connection exists between the land and water divisions of nature and the land and water moieties. This connection is through personal names, which usually have an implied reference to animate or inanimate natural objects or phenomena, although not infrequently to manufactured objects instead. The objects or phenomena referred to in personal names belong, as a rule, either to the water or to the land side of nature. The names are applied according as the individual is of the water or of the land moiety. Hence, it may be said that each moiety is connected through the personal names of its members with a more or less definite group of objects and phenomena.

The ensuing very incomplete lists, the contents of which were spontaneous on the part of informants, give some idea of the dual classification of nature. The reason for placing on the "water" side certain creatures which are actually land animals is hard to understand. An informant explained two of the cases to me as follows: The quail is placed on the water side because a turtle once turned into a quail; while the coyote is placed on the water side because Coyote won a bet with the creator and the latter had to go to the sky and take a land-side name, while Coyote remained on earth and took a water-side name.

On the water side are coyote, deer, antelope, beaver, otter, quail, dove, kingbird, bluebird, turkey, vulture, killdeer, jacksnipe, goose, crane, kingfisher, swan, land salamander, water snake, eel, whitefish, minnow, katydid, butterfly, clouds, and rainy weather.

On the land side are tree squirrel, dog, mountain lion, wildcat, raccoon, jay, hawk, condor, raven, California woodpecker, flicker, salmon-berry, "Indian potato," sky, and clear weather. . . .

The Central Sierra Miwok as a whole do not believe that they are descended from animals. They do believe, however, that they succeeded the animals on earth, which is the belief common to the typical central Californian stocks. This belief, that before the coming of the Indians animals possessed the world, is very different from the idea of descent from the totem.

Informants stated that in former days it was customary for people to "show respect" to the bear, the eagle, and the falcon after any of these had been killed. This was done by laying the body of the slain creature on a blanket and having a little feast in honor of it when it was brought to the hunter's home. So far as I could ascertain, this was not a ceremony connected with moieties or with totemism. It was no different in import from the offerings made by the Miwok when a condor was killed or when the young of a certain hawk were taken from the nest. This type of ceremony was common to a large part of California. The purpose was to appease the animal or its spirit. The ceremony was based on the belief that the animals possessed

dangerous supernatural power. Obviously the three cases in question are no different in motive from the above, or from the practices of other stocks, of which a notable example is the Maidu treatment of bears.

The supernatural powers obtained by shamans from animals were not received, except by coincidence, from the animal after which the shaman was named. A man of the water moiety might become a bear shaman just as readily as a man of the land moiety, even though bears and bear names are associated only with the latter moiety. Apparently a man's moiety and his personal name had no influence on his acquisition of supernatural power. The animal he was named after did not become his familiar or guardian spirit, except, as I have said, by coincidence.

CEREMONIES

The participation of the moieties as such in games and ceremonies was unimportant. Out of forty-four known ceremonies, the moieties took part as such in only four—the funeral, the mourning ceremony, the girl's puberty ceremony, and a dance known as the ahana. At least at Big Creek the moieties had reciprocal funerary functions, it being the duty of one moiety to care for the dead of the other. In the washing of the people which terminated the mourning ceremony washers of the water moiety tended one basket and washed people of the land moiety, while washers of the land moiety tended another basket and washed people of the water moiety. This custom, together with that of the moieties taking sides in game, obtained regularly at Big Creek, but not to such an extent elsewhere. This perhaps points to Big Creek as a place in which the moiety system was more firmly established.

In the girl's puberty ceremony it was customary for some girl, for whom the rites had previously been performed, to exchange dresses with the initiate. In all cases the two girls belonged to opposite moieties; if the initiate was of the water moiety, the girl who exchanged dresses with her must be of the land moiety. In the ahana dance the spectators, who made gifts to the dancers, were always of the opposite moiety but of the same sex as the dancers to whom they gave presents. . . .

PERSONAL NAMES

A child was named shortly after birth, preferably by a grandfather, but not infrequently by any one of the near relatives. The name received at that time was kept throughout life. Names of men and women did not differ. Occasionally a person received a nickname later in life.

The literal meanings or derivations, in part at least, as well as the connotations, of one hundred and forty-four personal names were obtained. Thirty-four of these names prove to be nouns or derivatives of nouns, and one hundred and two verbs or derivatives of verbs. . . .

To a strange Indian, not acquainted with the individual whose name is mentioned, verb names have only their literal meaning. To the friends and acquaintances of the individual, however, the name has more than its literal meaning. It has an implied meaning, which usually brings in a reference to an animate or inanimate object. For example, the personal name Wüksü is a form of the verb meaning "to go." Yet to the friends and relatives of the man his name meant "Sun going down." Another interesting case is found in the personal names Hausü and Hautcu, both derived from *hausus*, to yawn, or to gape. The former is a land moiety name and a bear is implied; the latter is a water moiety name and a salmon is implied. An extreme case, but one which throws light on the mental attitude of the name-giver, is that of the name Kuyunu. This name, according to the informant, had the connotation, "Dog wagging its tail." Kuyunu contains the same root as *kuyage*, to whistle. Apparently the name-giver thought of the whistling of a man to a dog as the cause of the dog wagging its tail, and, instead of naming the child after the action of the dog, named it after the cause of the dog's action; namely, whistling. Without knowledge of the individual, a Miwok, on hearing any of the above names, would be unable to decide as to the person's moiety or as to the animal or object implied. In the seventy bear names obtained, the word for bear is actually used in only one case.

In other words, among the Miwok there is absolutely nothing in the literal meanings of over 70 per cent. of the personal names even to suggest totemism. It is only in the implied meanings that the totemic element appears. In this respect there is a striking resemblance to the Mohave custom of calling women by names which have only an implied and perhaps esoteric reference to natural objects or phenomena, the coyote, for instance. . . .

Half-breeds born of Miwok mothers and white fathers are always considered as belonging to the moiety of which the mother is not a member. For example, if the mother is of the land moiety, the half-breed child will be of the water moiety and his or her name will refer to an animal or object identified with the water side of nature. . . .

MARRIAGES

Ninety-nine marriages were recorded among the Central Sierra Miwok, thirty-two of these being from Big Creek alone. In the following table proper marriages, that is, between individuals of different moieties, are indicated by W-L; improper marriages, that is, between individuals of the same moiety, are indicated by W-W for the water moiety and L-L for the land moiety.

	W-L	W-W	L-L	Percentage of proper marriages	Percentage of improper marriages
Village at Big Creek.....	26	5	1	81	19
Central Sierra Miwok, except Big Creek people.....	48	1	18	72	28
Central Sierra Miwok in general....	74	6	19	75	25

GENEALOGIES

In the genealogical information obtained there are forty-eight male lines of descent. Some of these are rather long, covering four or five generations. Others consist merely of two generations—a man and his offspring. Of these lines of descent only nine show complete transmission of the eponym of the paternal ancestor to the descendants. In other words, less than one-fifth of the Central Sierra Miwok families named all their children after the eponym of the father or other male ancestor of the group. Plainly, there is no rule of transmission of the eponym of the male ancestor, and consequently no widespread belief in descent from the eponymous animal. . . .

CROSS-COUSIN MARRIAGE

When asked if it were proper for a man to marry a cousin, Miwok informants always replied in the negative. In obtaining genealogical information, however, cases came up in which a man married his mother's brother's daughter. I called my informant's attention to this fact and received the reply that the individuals concerned were not regarded as cousins, for they stood in the relation of *añsi* and *anisü* to each other, which translated into English would be son and aunt, or potential stepmother. This affords an excellent example of the futility of using English terms of relationship with natives when discussing native customs.

Every Miwok to whom the question was put stated that the proper mate for a man was a woman who stood in the relation of *anisü* to him, providing she was not too closely related to him. Although a man might marry his *anisü*-cross-cousin, who was the daughter of his mother's brother, he could under no circumstances marry his *lupuba* cross-cousin, who was the daughter of his father's sister. This one-sidedness of cross-cousin marriage among the Miwok in no way affected its popularity, or, to be more exact, the popularity of *anisü*-*añsi* marriages, of which the cross-cousin marriage is one form. In many cases my informants would state that a certain man and his wife stood in the relation to each other of *añsi* and *anisü*. Although these instances were not substantiated, except in four cases, by genealogical proof, they show the popularity of this form of marriage. At Big Creek six of the listed marriages are of this type, eight are not, and on the remaining eight I have no information. Cases were encountered in which a husband and wife claimed to stand in the *añsi*-*anisü* relation to each other, but, when asked to demonstrate the relation, were unable to trace the connecting links. This state of affairs shows clearly that *añsi*-*anisü* marriages must have been the vogue, otherwise married people, who could not prove such a relationship would not lay claim to it. Even among the Northern Sierra Miwok at Elk Grove, among whom the moiety system does not seem to exist, *añsi*-*anisü* marriages were the custom. The Southern Sierra Miwok of Madera County state that these marriages were proper, but that the contracting parties must be only distantly related.

Informants at Jamestown, while stating that *anisü-añsi* marriages were prevalent there as elsewhere, said that marriages between first cousins, who stood in this relation, were commoner higher in the mountains than at Jamestown. The men at Jamestown and lower in the foothills were inclined to marry an *anisü* further removed than a first cousin. There seems to have been a sentiment at Jamestown against the marriage of first cousins. One woman was asked if she would consider it proper for her son to marry her brother's daughter. She replied, "No, she is too much like his mother," meaning herself. Her reply may have been engendered by the Miwok custom of a man marrying his wife's brother's daughter. By this marriage his new wife, who is also his son's *anisü* cross-cousin, would become his son's stepmother; hence perhaps the woman's statement with regard to her son's *anisü* cross-cousin, "too much like his mother."

37. AUSTRALIAN MARRIAGE CLASSES AND TOTEMS¹

By BALDWIN SPENCER AND F. J. GILLEN

MARRIAGE CLASSES

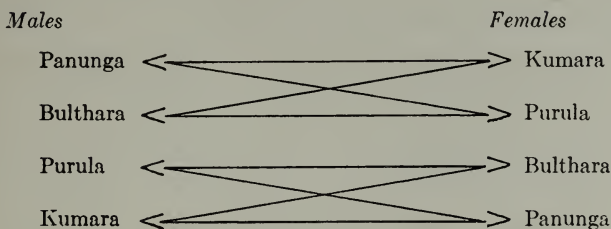
We may now turn to the consideration of the Arunta tribe in which descent is counted in the male line, and we may regard the Arunta as typical of the large group of tribes inhabiting the center of the continent from Lake Eyre in the south to near Port Darwin in the north, in which descent is thus counted. The tribes with the classificatory systems of which we have knowledge are the Arunta, Ilpirra, Iliaura, Kaitish, Walpari, Warramunga, Waagai, and Bingongina, which occupy a range of country extending from the latitude of Macumba River in the south to about that of Powell's Creek in the north, that is over an area measuring from north to south some seven hundred and seventy miles.

In regard to the organization of the Arunta tribe, with which we shall now deal in detail, it may at the outset be mentioned that the existence of four sub-classes in the southern part of the tribe, and of eight in the northern, appears at first sight to indicate that in the latter the organization is more complex. In reality, though without having distinct names applied to them, each one of the four sub-classes met with in the south is actually divided into two. The four are Panunga and Bulthara, Purula and Kumara; the first two forming one moiety of the tribe, and the latter two forming another. In camp, for example, the Panunga and Bulthara always camp together separated from the Purula and Kumara by some natural feature such as a creek. The Panunga and Bulthara speak of themselves as *Nakrakia*, and of the Purula and Kumara as *Mulyanuka*—the terms being reciprocal. Further details with regard to this, and evidence of this division into two moieties, are given in connection with the discussion of the Churinga and totems, and in the account of the Engwura.

The marriage system is, in broad outline, omitting at present certain details which will be referred to shortly, as follows. A Bulthara man marries a Kumara woman and their children are Panunga; a Purula man marries a Panunga woman and their children are Kumara; a Panunga man marries a Purula woman and their children are Bulthara; a Kumara man marries a Bulthara woman and their children are Purula.

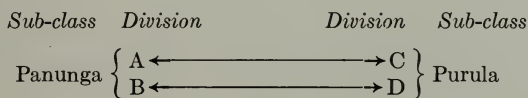
¹From pages 70-75 and 112-127 of Baldwin Spencer and F. J. Gillen, *The Native Tribes of Central Australia*, Macmillan, London, 1899. By permission.

This may be graphically expressed following Mr. Howitt's plan (as already done by Dr. Sterling) in the following way.



In these diagrams the double arrow indicates the marriage connections and the single ones point to the name of the class of the children.

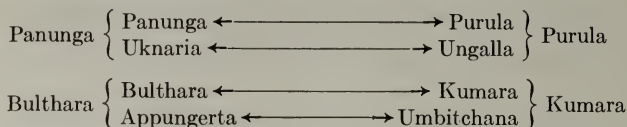
As a matter of fact these diagrams as they stand, though perfectly correct in stating, for example, that a Panunga man marries a Purula woman, are incomplete in that they do not show the important point that to a Panunga man the Purula women are divided into two groups the members of one of whom stand to him in the relationship of Unawa whom he may marry, while the members of the other stand in the relationship of Unkulla whom he may not marry. This fact is one of very considerable importance. Each of the four sub-classes is thus divided into two, the members of which stand respectively in the relationship of Ipmunna to each other. We can represent this graphically as follows, taking, for the sake of simplicity, only two sub-classes, the divisions of one being represented by the letters A and B, and of the other by the letters C and D.



A stands in the relationship of Unawa to C, Ipmunna to B, and Unkulla to D. In other words a woman who is Unkulla to me is Ipmunna to my wife. All women of group C (myself belonging to A), my wife calls sisters—Un-garaitcha if they be elder sisters, and Itia if they be younger sisters; and all of them stand in the relationship of Unawa to myself; but the other Purula woman whom my wife calls Ipmunna are Unkulla to me and I may not marry them.

It is somewhat perplexing after learning that Panunga man must marry a Purula woman to meet with the statement, when inquiring into particular cases, that a given Panunga man must not marry a particular Purula woman, but in the northern part of the tribe matters are simplified by the existence of distinct names for the two groups; the relationship term of Ipmunna still

exists, but if I am, for example, a Panunga man, then all my Ipmunna men and women are designated by the term Uknaria, and in the following tables the eight divisions are laid down, and it will be noticed that the old name is used for one-half and a new name adopted for the other.



The double arrows indicate the marriage connections.

This division into eight has been adopted (or rather the names for the four new divisions have been), in recent times by the Arunta tribe from the Ilpirra tribe which adjoins the former on the north, and the use of them is, at the present time, spreading southwards. At the Engwura ceremony which we witnessed men of the Ilpirra tribe were present, as well as a large number of others from the southern part of the Arunta amongst whom the four new names are not yet in use.

We have found the following table of considerable service to ourselves in working as, by its means, the various relationships fall into regular arrangement and can be readily indicated.

1	2	3	4
Panunga	Purula	Appungerta	Kumara
Uknaria	Ungalla	Bulthara	Umbitchana
Bulthara	Kumara	Uknaria	Purula
Appungerta	Umbitchana	Panunga	Ungalla

This table was drawn up in the first instance in order to show the marriage relationships and the divisions into which the children pass. Thus, reading across the page, men of the sub-classes shown in column 1 must marry women of the sub-classes shown in column 2. For example, a Panunga man marries a Purula woman, an Uknaria man an Ungalla woman, and so on. Column 3 in the same way indicates their children, those of a Panunga man and a Purula woman being Appungerta, those of an Uknaria man and a Ungalla woman being Bulthara, etc. In the same way if a man of one of the sub-classes in column 2 marries a woman in one of those in column 1, then their children are as represented in column 4. That is, a Purula man marries a Panunga woman and their children are Kumara, and so on. . . .

In the Arunta tribe, unlike the Urabunna, there is, as soon as marriage has taken place, a restriction, except on certain special occasions which are subsequently described, of a particular woman to a particular man, or rather, a man has an exclusive right to one special woman though he may of his own free will lend her to other men.

Despite this fact, there is no term applied to a woman who is thus the peculiar property of one man, the woman is simply spoken of as Unawa to the man in just the same way in which all the other women are who belong to the group from which the man's wife must come. The terms of relationship are not individual terms, but, just as in the Urabunna and other tribes in some of which we have a form of group marriage existing as an actual institution at the present day, the terms are group terms. To take an example—a Panunga man will have some special woman allotted to him as an individual wife, but the only term which he applies to her is Unawa, and that term he also applies to all the women of her group, each of whom might lawfully have been allotted to him. She is one out of a group of potential wives. When, again, a man lends his wife, he only does so to a member of his own group, that is to a man to whom, without having been allotted to him, the woman stands in the relationship of Unawa just as she does to the man to whom she has been allotted. In the southern part of the tribe, where only the four divisions exist, a Panunga man will not lend his Unawa to a man who belongs to the half of the Panunga to which he himself does not belong, that is he will not lend her to an Ipmunna man but only to men who are Okilia or Itia to him; and in the same way he will only have lent to him a Purula woman to whom he is Unawa and not one to whom he is Unkulla. In the northern division the original Panunga is divided up into Panunga and Ungalla, and here a Panunga man only lends his wife to a Panunga, an Ungalla to an Ungalla, and so on. In this northern part it must be remembered that the Panunga men are the exact equivalents to another Panunga man of the Okilia and Itia, that is the tribal brothers of the southern part, while the Ungalla correspond to the Ipmunna.

The same group terms are applied in all other cases. Thus a man calls his own children Allira, and applies the same term to all his blood and tribal brothers' children, while all his sisters' children are Umba. If, again, I am a Panunga man, then my wife is Purula, and her actual father is a Kumara man. Not only do I call this particular man Ikuntera or father-in-law, but, where the eight divisions are in force, I apply the same name to all Kumara men. They are one and all the fathers of women whom it is lawful for me to marry.

That this group relationship is actually recognized is made clear by a variety of facts. If, for example, one of my Ikuntera dies, it is my duty to cut my shoulders with a stone knife as a mark of sorrow. If I neglect to do this, then any one of the men who are Ikuntera to me has the right to take away my wife and give her to some other man to whom she is Unawa. I have not only, supposing it to be the actual father of my wife who has died, neglected to do my duty to him, but I have offended the group collectively, and any member of that group may punish me. Again, if I am out hunting and have caught game, and while carrying this home to my camp I chance to meet a man standing to me in the relationship of Ikuntera, I should at once have to drop the food, which, from the fact of its having been seen by any one member of that group, has become tabu to me.

In just the same way amongst the women we see clear instances of customs founded on the existence of group relationship. When a child dies not only does the actual *Mia*, or mother, cut herself, but all the sisters of the latter, who also are *Mia* to the dead child, cut themselves. All women call their own children *Umba*, and apply precisely the same term to the children of their sisters, blood and tribal . . .

TOTEMS

Every individual of the tribes with which we are dealing is born into some totem—that is, he or she belongs to a group of persons each one of whom bears the name of, and is especially associated with, some natural object. The latter is usually an animal or plant; but in addition to those of living things, there are also such totem names as wind, sun, water, or cloud—in fact there is scarcely an object, animate or inanimate, to be found in the country occupied by the natives which does not give its name to some totemic group of individuals. . . .

Passing northwards from the *Urabunna* into the *Arunta* tribe, we are brought into contact with a very different organization, but with one which, in regard to the class names, is typical of tribes which occupy an area extending north and south for some 800 miles, and east and west for perhaps between 200 and 300. We find also essentially the same system in tribes inhabiting other parts of Australia, such as the *Turribul*, living on the *Maryborough* river in *Queensland*. Without entering here into details, which will be fully explained subsequently, we may say that, so far as the class is concerned, descent is counted in the male line. The totem names are, however, at first sight decidedly perplexing. Just as in the *Urabunna* tribe, every individual has his or her totem name. In the first place, however, no one totem is confined to the members of a particular class or sub-class; in the second place the child's totem will sometimes be found to be the same as that of the father, sometimes the same as that of the mother, and not infrequently it will be different from that of either parent; and in the third place there is no definite relationship between the totem of the father and mother, such as exists in the *Urabunna* and many other Australian tribes—in fact perhaps in the majority of the latter. You may, for example, examine at first a family in which the father is a witchetty grub and the mother a wild cat, and you may find, supposing there be two children, that they are both witchetty grubs. In the next family examined perhaps both parents will be witchetty grubs, and of two children one may belong to the same totem, and the other may be an emu; another family will show the father to be, say, an emu, the mother a plum-tree, and of their children one may be a witchetty grub, another a lizard, and so on, the totem names being apparently mixed up in the greatest confusion possible.

We give below the actual totem names of five families, selected at random, who are now living in the northern section of the Arunta tribe, and these may be taken as accurately representative of the totem names found in various families throughout the tribe. After making very numerous and as careful inquiries as possible, always directly from the natives concerned, we can say that every family shows the same features as these particular examples do with regard to the totems, the names of the latter varying, of course, from family to family and in different parts of the country, certain totems predominating in some, and others in other parts. You may, for example, find yourself in one district of more or less limited area and find one totem largely represented; travelling out of that district, you may meet but rarely with that particular totem until you come into another and perhaps distant part, where—it may be forty or fifty miles away—it again becomes the principal one. The reason for, or rather the explanation of, this curious local distribution, as given by the natives, will be seen presently.

Family 1. Father, little hawk. Wife No. 1, rat; daughter, witchetty grub. Wife No. 2, kangaroo; no children. Wife No. 3, lizard; two daughters, one emu, the other water.

Family 2. Father, eagle-hawk. Wife No. 1, Hakea flower; no children. Wife No. 2, Hakea flower; four sons, who are respectively witchetty grub, emu, eagle-hawk, elonka; two daughters, both witchetty grubs.

Family 3. Father, witchetty grub. Wife No. 1, lizard; two sons, one lizard, the other witchetty grub. Wife No. 2, lizard.

Family 4. Father, emu. Wife, munyeru; two sons, one kangaroo, the other, wild cat; one daughter, lizard.

Family 5. Father, witchetty grub. Wife, witchetty grub; two sons, one, kangaroo, the other, witchetty grub; one daughter, witchetty grub.

Taking these as typical examples of what is found throughout the whole tribe, we can see that while, as already stated, marriages are strictly regulated by class rules, the question of totem has nothing to do with the matter either so far as making it obligatory for a man of one totem to marry a woman of another particular one, or so far as the totem of the children is concerned. The totem name of the child does not of necessity follow either that of the father or that of the mother, but it may correspond to one or both of them. . . .

It was while watching and questioning closely the natives, during the performance of the Engwura ceremony—a description of which will be found in a later chapter—that we were able to find out the way in which the totem names of the individuals originate and to gain an insight into the true nature of their totemic system. . . .

The whole past history of the tribe may be said to be bound up with these totemic ceremonies, each of which is concerned with the doings of certain mythical ancestors who are supposed to have lived in the dim past, to which the natives give the name of the “Alcheringa.”

In the Alcheringa lived ancestors who, in the native mind, are so intimately associated with the animals or plants the name of which they bear that an Alcheringa man of, say, the kangaroo totem may sometimes be spoken of either as a man-kangaroo or as a kangaroo-man. The identity of the human individual is often sunk in that of the animal or plant from which he is supposed to have originated. It is useless to try and get further back than the Alcheringa; the history of the tribe as known to the natives commences then.

Going back to this far-away time, we find ourselves in the midst of semi-human creatures endowed with powers not possessed by their living descendants and inhabiting the same country which is now inhabited by the tribe, but which was then devoid of many of its most marked features, the origin of which, such as the gaps and gorges in the Maconnell Ranges, is attributed to these mythical Alcheringa ancestors.

These Alcheringa men and women are represented in tradition as collected together in companies, each of which consisted of a certain number of individuals belonging to one particular totem. Thus, for example, the ceremonies of the Engwura dealt with four separate groups of Achilpa or wild cat men.

Whilst every now and then we come across traditions, according to which, as in the case of the Achilpa, the totem is common to all classes, we always find that in each totem one moiety of the tribe predominates, and that, according to tradition, many of the groups of ancestral individuals consisted originally of men or women or of both men and women who all belonged to one moiety. Thus in the case of certain Okira or kangaroo groups we find only Kumara and Purula; in certain Udnirringita or witchetty grub groups we find only Bulthara and Panunga; in certain Achilpa or wild cat a predominance of Kumara and Purula, with a smaller number of Bulthara and Panunga.

At the present day no totem is confined to either moiety of the tribe, but in each local center we always find a great predominance of one moiety, as for example at Alice Springs, the most important center of the witchetty grubs, where, amongst forty individuals, thirty-five belong to the Bulthara and Panunga, and five only to the other moiety of the tribe.

These traditions in regard to the way in which the Alcheringa ancestors were distributed into companies, the members of which bore the same totem name and belonged, as a general rule, to the same moiety of the tribe, are of considerable importance when we come to consider the conditions which now obtain with regard to totems. It is not without importance to notice that the traditions of the tribe point back to a time when, for the most part, the members of any particular totem were confined to one moiety of the tribe, in face of the fact that at the present day it seems to be a characteristic feature of many tribes—such as the Urabunna, which are in a less highly developed state than the Arunta, Ilpirra and certain other tribes of Central Australia—that the totems are strictly confined to one or other of the two moieties of the tribe, and that they regulate marriage. At the same time it may again be pointed out

that the totems in no way regulate marriage in the tribes mentioned, and, further still, we can find no evidence in any of the traditions, numerous and detailed as they are, of a time when marriage in these tribes was ever regulated by the totems.

If now we turn to the traditions and examine those relating to certain totems which may be taken as illustrative of the whole series, we find that they are concerned almost entirely with the way in which what we may call the Alcheringa members of the various totems came to be located in various spots scattered over the country now occupied by the tribe the members of which are regarded as their descendants, or, to speak more precisely, as their reincarnations. . . .

Each of these Alcheringa ancestors is represented as carrying about with him, or her, one or more of the sacred stones, which are called by the Arunta natives Churinga, and each of these Churinga is intimately associated with the idea of the spirit part of some individual. Either where they originated and stayed, as in the case of certain of the witchetty grub people, or else where, during their wanderings, they camped for a time, there were formed what the natives call Oknanikilla, each one of which is in reality a local totem center. At each of these spots, and they are all well known to the old men, who pass the knowledge on from generation to generation, a certain number of the Alcheringa ancestors went into the ground, each one carrying his Churinga with him. His body died, but some natural feature, such as a rock or tree, arose to mark the spot, while his spirit part remained in the Churinga. At the same time many of the Churinga which they carried with them, and each one of which had associated with it a spirit individual, were placed in the ground, some natural object again marking the spot. The result is that, as we follow their wanderings, we find that the whole country is dotted over with Oknanikilla, or local totem centers, at each of which are deposited a number of Churinga, with spirit individuals associated with them. Each Oknanikilla is, of course, connected with one totem. In one part we have a definite locality, with its group of wild cat spirit individuals; in another, a group of emu; in another, a group of frog, and so on through the various totems; and it is this idea of spirit individuals associated with Churinga and resident in certain definite spots that lies at the root of the present totemic system of the Arunta tribe.

As we have said, the exact spot at which a Churinga was deposited was always marked by some natural object, such as a tree or rock, and in this the spirit is supposed to especially take up its abode, and it is called the spirit's Nanja.

We may take the following as a typical example of how each man and woman gains a totem name. Close to Alice Springs is a large and important witchetty grub totem center or Oknanikilla. Here there were deposited in the Alcheringa a large number of Churinga carried by witchetty grub men and women. A large number of prominent rocks and boulders and certain ancient

gum-trees along the sides of a picturesque gap in the ranges, are the Nanja trees and rocks of these spirits, which, so long as they remain in spirit form, they usually frequent. If a woman conceives a child after having been near to this gap, it is one of these spirit individuals which has entered her body, and therefore, quite irrespective of what the mother's or father's totem may chance to be, that child, when born, must be necessity be of the witchetty grub totem; it is, in fact, nothing else but the reincarnation of one of the witchetty grub people of the Alcheringa. Suppose, for example, to take a particular and actual instance, an emu woman from another locality comes to Alice Springs, and whilst there becomes aware that she has conceived a child, and then returns to her own locality before the child is born, that child, though it may be born in an emu locality, is an Udnirringita or witchetty grub. It must be, the natives say, because it entered the mother at Alice Springs, where there are only witchetty grub spirit individuals. Had it entered her body within the limits of her own emu locality, it would as inevitably have been an emu. To take another example, quite recently the lubra or wife of a witchetty grub man, she belonging to the same totem, conceived a child while on a visit to a neighboring Quatcha or water locality, which lies away to the east of Alice Springs, that child's totem is water; or, again, an Alice Springs woman, when asked by us as to why her child was a witchetty grub (in this instance belonging to the same totem as both of its parents), told us that one day she was taking a drink of water near to the gap in the Ranges where the spirits dwell when suddenly she heard a child's voice crying out, "Mia, mia!"—the native term for relationship which includes that of mother. Not being anxious to have a child she ran away as fast as she could, but to no purpose; she was fat and well favored, and such women the spirit children prefer; one of them had gone inside her, and of course it was born a witchetty grub. . . .

Such examples could be multiplied indefinitely; but these, which may be taken as typical ones, will serve to show that, though at first sight puzzling, yet in reality the totem name follows a very definite system, if once we grant the premises firmly believed in by the Arunta native. . . .

What has gone before will serve to show what we mean by speaking of the totems as being local in their distribution. The whole district occupied by the Arunta, and the same holds true of the Ilpirra and Kaitish tribes, can be mapped out into a large number of areas of various sizes, some of which are actually only a few square yards in extent, while others occupy many square miles, and each of which centers in one or more spots, for which the native name is Oknanikilla—a term which may be best rendered by the phrase "local totem center." Each of these represents a spot where Alcheringa ancestors either originated or where they camped during their wanderings, and where some of them went down into the ground with their Churinga, or where they deposited Churinga. In any case the Churinga remained there, each one associated with a spirit individual, and from these have sprung, and still continue to spring, actual men and women who of necessity bear the totem name of the Churinga from which they come.

38. THE POTLATCH OF THE KWAKIUTL INDIANS OF
VANCOUVER ISLAND¹

By FRANZ BOAS

Before proceeding any further it will be necessary to describe the method of acquiring rank. This is done by means of the *potlatch*, or the distribution of property. This custom has been described often, but it has been thoroughly misunderstood by most observers. The underlying principle is that of the interest-bearing investment of property.

The child when born is given the name of the place where it is born. This name (*g'i'nLaxLē*) it keeps until about a year old. Then his father, mother, or some other relative, gives a paddle or a mat to each member of the clan and the child receives his second name (*nā'ma'p'axLēya*). When the boy is about ten or twelve year old, he obtains his third name (*gōmiatsExLä'yē*). In order to obtain it he must distribute a number of small presents such as shirts or single blankets among his own clan or tribe. When the youth thus starts out in life he is liberally assisted by his elders, particularly by the nobility of the tribe.

I must say here that the unit of value is the single blanket, now-a-days a cheap white woolen blanket, which is valued at fifty cents. The double blanket is valued at three single blankets. These blankets form the means of exchange of the Indians, and everything is paid for in blankets or in objects the value of which is measured by blankets. When a native has to pay debts and has not a sufficient number of blankets, he borrows them from his friends and has to pay the following rates of interest:

For a period of a few months, for five borrowed blankets six must be returned (*Lē'k'ō*); for a period of six months, for five borrowed blankets seven must be returned (*mā'Laxsa Lē'k.ōyō*); for a period of twelve months or longer, for five borrowed blankets ten must be returned (*dē'ida* or *g'ē'La*).

When a person has a poor credit, he may pawn his name for a year. Then the name must not be used during that period, and for thirty blankets which he has borrowed he must pay 100 in order to redeem his name. This is called *q'ā'q'oaxō* ("selling a slave").

¹From Franz Boas, "The Social Organization and the Secret Societies of the Kwakiutl Indians," *Report of the U. S. National Museum for 1895*, Washington (1897), pages 341-346, 358-359.

The rate of interest of the *Lē'k'ō* varies somewhat around 25 per cent., according to the kindness of the loaner and the credit of the borrower. For a very short time blankets may be loaned without interest. This is designated by the same term.

When the boy is about to take his third name, he will borrow blankets from the other members of the tribe, who all assist him. He must repay them after a year, or later, with 100 per cent. interest. Thus he may have gathered 100 blankets. In June, the time set for this act, the boy will distribute these blankets among his own tribe, giving proportionately to every member of the tribe, but a few more to the chief. This is called *Lā'X'uit*. When after this time any member of the tribe distributes blankets, the boy receives treble the amount he has given. The people make it a point to repay him inside of a month. Thus he owns 300 blankets, of which, however, he must repay 200 after the lapse of a year. He loans the blankets out among his friends, and thus at the close of the year he may possess about 400 blankets.

The next June he pays his debts (*quoana'*) in a festival, at which all the clans from whom he borrowed blankets are present. The festival is generally held on the street or on an open place near the village. Up to this time he is not allowed to take part in feasts. But now he may distribute property in order to obtain a potlatch name (*p'ā'tsaxLāyē*). This is also called *Lā'X'uit*.

At this time the father gives up his seat (*Lā'Xoē*) in favor of his son. After the boy has paid his debts, the chief calls all the older members of the tribe to a council, in which it is resolved that the boy is to receive his father's seat. The chief sends his speaker to call the boy, and his clan go out in company with the speaker. The young man—for henceforth he will be counted among the men—dresses with a black headband and paints long vertical stripes, one on each side of his face, running down from the outer corners of the eyes. The stripes represent tears. He gives a number of blankets to his friends who carry them into the house where the council is being held. The speaker enters first and announces his arrival. The young man follows and after him enter his friends, carrying blankets. He remains standing in front of the fire, and the chief announces to him that he is to take his father's seat. Then the boy distributes his blankets among the other clans and sells some for food, with which a feast is prepared. His father gives up his seat and takes his place among the old men (*Nō'matsēiL*). The blankets given away at this feast are repaid with 100 per cent. interest. In this manner the young man continues to loan and to distribute blankets and thus is able with due circumspection and foresight to amass a fortune. Sometimes it happens that the successor to a man's name (*Lawu'lgame*) already has a name of his own. In all such cases (also when the name is acquired by inheritance) the successor gives up his name and his property to his own successor.

Possession of wealth is considered honorable, and it is the endeavor of each Indian to acquire a fortune. But it is not as much the possession of wealth as the ability to give great festivals which makes wealth a desirable

object to the Indian. As the boy acquires his second name and a man's estate by means of a distribution of property, which in course of time will revert to him with interest, the man's name acquires greater weight in the councils of the tribe and greater renown among the whole people, as he is able to distribute more and more property at each subsequent festival. Therefore boys and men are vying with each other in the arrangement of great distributions of property. Boys of different clans are pitted against each other by their elders, and each is exhorted to do his utmost to outdo his rival. And as the boys strive against each other, so do the chiefs and the whole clans, and the one object of the Indian is to outdo his rival. Formerly feats of bravery counted as well as distributions of property, but nowadays, as the Indians say, "rivals fight with property only." . . .

I referred several time to the distribution of blankets. The recipient in such a distribution is not at liberty to refuse the gift, although according to what I have said it is nothing but an interest-bearing loan that must be repunded at some future time with 100 per cent. interest. This festival is called *p'a'sa*, literally, "flattening something" (for instance, a basket). This means that by the amount of property given the name of the rival is flattened.

There is still another method of rising in the social scale, namely, by showing one's self superior to the rival. This may be done by inviting the rival and his clan or tribe to a festival and giving him a considerable number of blankets. He is compelled to accept these, but is not allowed to do so until after he has placed an equal number of blankets on top of the pile offered to him. This is called *dāpEntg'ala* and the blankets placed on top of the first pile are called *dā'pEnō*. Then he receives the whole pile and becomes debtor to that amount, *i.e.*, he must repay the gift with 100 per cent. interest.

A similar proceeding takes place when a canoe is given to a rival. The latter, when the gift is offered to him, must put blankets to the amount of half the value of the canoe onto it. This is called *dā'g'ot*, "taking hold of the bow of the canoe." These blankets are kept by the first owner of the canoe. Later on, the recipient of the canoe must return another canoe, together with an adequate number of blankets, as an "anchor line" for the canoe. This giving of a canoe is called *sā'k'a*.

Still more complicated is the purchase or the gift, however one chooses to term it, of a "copper." All along the North Pacific Coast, from Yakutat to Comox, curiously shaped copper plates are in use, which in olden times were made of native copper, which is found in Alaska and probably also on Nass River, but which nowadays are worked out of imported copper. . . . These coppers have the same function which bank notes of high denominations have with us. The actual value of the piece of copper is small but it is made to represent a large number of blankets and can always be sold for blankets. The value is not arbitrarily set but depends upon the amount of property given away in the festival at which the copper is sold. On the whole, the oftener a copper is sold the higher its value, as every new buyer tries to invest

more blankets in it. Therefore the purchase of a copper also brings distinction, because it proves that the buyer is able to bring together a vast amount of property.

Each copper has a name of its own, and from the following list of coppers, which were in Fort Rupert in 1893, the values attached to some of them may be seen:

Mā'xts'ōlem ("all other coppers are ashamed to look at it"), 7500 blankets.

L'ā'xolamas ("steel-head salmon," *i.e.*, it glides out of one's hands like a salmon), 6000 blankets.

Lō'pēLila ("making the house empty of blankets"), 5000 blankets.

De'nt'alayō ("about whose possession all are quarrelling").

Mau'ak'a ("sea-lion").

Qau'lō'ma ("beaver face").

Lē'ita ("looking below"; namely, in order to find blankets with which to buy it).

Nū'sē ("moon"; its engraving represents the half-moon, in which a man is sitting).

G'ā'waqa ("a spirit." He'iltsuq dialect, corresponding to the Kwakiutl Ts'ō'nōqoa).

Ne'lqEmāla ("dry face").

Ne'nqEmāla ("bear face").

K'ā'na ("crow"; Hē'iltsuq dialect).

Qoayī'm ("whale").

Ma'x'ēnōx ("killer whale").

Qoayī'mk.in ("too great a whale").

Wī'na ("war," against the blankets of the purchaser).

The purchase of a high-priced copper is an elaborate ceremony, which must be described in detail. The trade is discussed and arranged long beforehand. When the buyer is ready, he gives to the owner of the copper blankets about one-sixth of the total value of the copper. This is called "making a pillow" for the copper (*qē'nulīLa*); or "making a feather bed" (*ta'lqoa*) or "the harpoon line at which game is hanging" (*dō'XsEmt*), meaning that in the same manner the copper is attached to the long line of blankets; or "taken in the hand, in order to lift the copper" (*dā'g'ilēlEm*). The owner of the copper loans these blankets out, and when he has called them in again, he repays the total amount received, with 100 per cent. interest, to the purchaser. On the following day the tribes assemble for the sale of the copper. The prescribed proceeding is as follows: The buyer offers first the lowest price at which the copper was sold. The owner declares that he is satisfied, but his friends demand by degrees higher and higher prices, according to all the previous sales of the copper. This is called *g'i'na*. Finally, the amount offered is deemed satisfactory. Then the owner asks for boxes to carry away the blankets. These are counted five pairs a box, and are also paid in blankets or other objects.

After these have been paid, the owner of the copper calls his friends—members of his own tribe—to rise, and asks for a belt, which he values at several hundred blankets. While these are being brought, he and his tribe generally repair to their house, where they paint their faces and dress in new blankets. When they have finished, drums are beaten in the house, they all shout “hi!” and go out again, the speaker of the seller first. As soon as the latter has left the house he turns and calls his chief to come down, who goes back to where the sale is going on, followed by his tribe. They all stand in a row and the buyer puts down the blankets which were demanded as a belt, “to adorn the owner of the copper.” This whole purchase is called “putting the copper under the name of the buyer” (*Lā’sa*.)

In this proceeding the blankets are placed in piles of moderate height, one pile close to the other, so that they occupy a considerable amount of space. In Fort Rupert there are two high posts on the beach bearing carved figures on top, between which the blankets are thus piled. They stand about forty steps apart.

On the following day all the blankets which have been paid for the copper must be distributed by the owner among his own tribe, paying to them his old debts first, and, if the amount is sufficient, giving new presents. This is called “doing a great thing” (*wā’lasila*).

Coppers are always sold to rivals, and often a man will offer his copper for sale to the rival tribe. If it is not accepted, it is an acknowledgement that nobody in the tribe has money enough to buy it, and the name of the tribe or clan would consequently lose in weight. Therefore, if a man is willing to accept the offer, all the members of the tribe must assist him in this undertaking with loans of blankets. Debts which are repaid in the *wā’lasia* were mostly contracted in this manner.

MARRIAGE

Marriage among the Kwakiutl must be considered a purchase, which is conducted on the same principles as the purchase of a copper. But the object bought is not only the woman, but also the right of membership in her clan for the future children of the couple. I explained before that many privileges of the clan descend only through marriage upon the son-in-law of the possessor, who, however, does not use them himself, but acquires them for the use of his successor. These privileges are, of course, not given as a present to the son-in-law, but he becomes entitled to them by paying a certain amount of property for his wife. The wife is given to him as a first installment of the return payment. The crest of the clan, its privileges, and a considerable amount of other property besides, are given later on, when the couple have children, and the rate of interest is the higher the greater the number of children. For one child, 200 per cent. of interest is paid; for two or more children, 300 per cent. After this payment the marriage is annulled, because the

wife's father has redeemed his daughter. If she continues to stay with her husband, she does so of her own free will (*wūle'L*, "staying in the house for nothing"). In order to avoid this state of affairs, the husband often makes a new payment to his father-in-law in order to have a claim to his wife.

The law of descent through marriage is so rigid that methods have developed to prevent the extinction of a name when its bearer has no daughter. In such a case a man who desires to acquire the use of the crest and the other privileges connected with the name performs a sham marriage with the son of the bearer of the name (*Xuē'sa*; Newetee dialect: *dā'xsitsEnt*, "taking hold of the foot"). The ceremony is performed in the same manner as a real marriage. In case the bearer of the name has no children at all, a sham marriage with part of his body is performed, with his right or left side, a leg or an arm, and the privileges are conveyed in the same manner as in the case of a real marriage.

It is not necessary that the crest and privileges should be acquired for the son of the person who married the girl, but they may be transferred to his successor, whoever that may happen to be.

39. SHELL-MONEY OF NEW BRITAIN¹

By BENJAMIN DANKS

The shell-money of New Britain is a very important factor in the life of a New Britain savage. Any account of the New Britain people, their lives and their customs, will fall short of what it should be if this important currency is not discussed.

The name of this money on the Duke of York group and New Ireland is Diwára. On New Britain it is called Tambu. . . .

The shell of which Tambu is made is very small. It is procured from the people who live on the N. W. coast of New Britain. I have not been able to ascertain the exact part of the coast. In company with the Rev. G. Brown and others I went to the place where the people from the Gazelle Peninsula purchase it. When we asked the people where it was obtained they pointed us still further west. I have seen ornaments from the east coast of New Guinea, and from that fact think that possibly the shell may be found on Brooks Island between New Britain and New Guinea. When purchased at Nakanai the shells are just as they are found upon the beach or dug from the earth. They are done up in packets varying in size, and consequently in value also. The secret as to where they are obtained is very jealously kept by the Nakanai people. I have never found one man in the Gazelle Peninsula who had the faintest idea as to its whereabouts. It is evidently a trade secret, kept close by the Nakanai people in order to prevent the Pele and other trade from passing their country.

When brought from Nakanai, each man sits down and threads his shells on long strips of cane. A hole is first punched through the back of the shells. The strips of cane, which are about two feet six inches in length, are scraped or pared down to the required size, and the shells are then strung. To join these pieces of cane one end of one piece is made wedge-shape. One end of another piece is split a little down the centre. The wedge end of the one piece is put between the two halves of the split end of the other piece, and a few shells are drawn over the splice, binding the two sides of the one piece on the wedge of the other. This process is repeated until all the shells are strung into one long length, which is then rolled up into coils ranging from sixty to four and five hundred fathoms. The coil is then carefully and neatly wrapped up in banana leaves and suspended in the treasure-house until required.

¹From Benjamin Danks, "On the Shell-Money of New Britain," in *Journal of the [Royal] Anthropological Institute [of Great Britain and Ireland]*, volume 17, pages 305-317, 1888.

The money thus prepared is the national currency. By it trade is carried on and it enters largely into every custom and ceremony of the land. It can be, and is, divided as easily as we divide our pounds into shillings and shillings into pence. For the sake of illustration let their fathom of Tambu be represented by our £. Then half fathom = 10s. Quarter fathom = 5s., and lowest of all two shells may represent our farthing. The length we have called a fathom is the distance between the two hands, when they are stretched out straight in opposite directions. A man is praised according to the good full measure he gives, and execrated according to the short measure he may give. The word for purchasing a thing is *kul*. The word for barter, *i.e.*, exchange of produce, is *buapa*, thus showing that the two ideas are as distinct in the minds of the natives as they are in our own.

There are fixed prices for some things. Prices for other things differ, as with us, according to the law of supply and demand. All articles of food remain at much about the same price. The following is a list of prices obtaining in New Britain:—

Salmon, large.....	$\frac{1}{2}$ fathom Tambu.
Fowls according to size.....	$\frac{1}{2}$ to $\frac{1}{4}$ fathom Tambu.
Breadfruit, sixty for.....	1 fathom Tambu.
Taro ² and yams according to state of crop, if plentiful, sixty for.....	1 fathom Tambu.
If scarce, fifty for.....	1 fathom Tambu.
Betel-nuts, a large bunch.....	$\frac{1}{4}$ fathom Tambu.
Twelve betel-nuts.....	4 shells only.
Canoes, large.....	20, 25, 30, 50 fathoms Tambu.
Canoes, small.....	7 fathoms and upwards Tambu.
Pigs according to size, from.....	7 to 10 fathoms Tambu.
Dogs according to size, from.....	2 to 3 fathoms Tambu.
Cockatoos.....	2 to 5 fathoms Tambu.
2 yards print.....	1 fathom Tambu.
1 tomahawk (good).....	3 to 4 fathoms Tambu.
Large plantation knife.....	3 fathoms Tambu.
Large fishing nets.....	40 to 50 fathoms Tambu.
Small fishing nets.....	1, 2, 3, 4 fathoms Tambu.

Husband and wife possess this money quite independently of each other. The children also, almost as soon as they can understand anything, are taught that the acquisition and retention of wealth is an important, if not the most important, duty of life. To let money go for nothing in return or to pay a shell more than is necessary for an article is considered the height of folly. Consequently little boys and girls have their little store and bank, and are keen traders. A wife, however, is often despoiled of her money by her husband. Not indeed by force. That would be an invasion of the rights of property, and an offence against the public conscience. The husband perhaps gets up a

²In purchasing vegetable food, it often happens that a man will buy the whole of a neighbour's crop before it is dug, for a greater or smaller sum according to the size of the plantation and yield. I have purchased crops thus at from ten fathoms to twenty and twenty-five fathoms of Tambu.

charge of adultery against his wife, he becomes very angry and threatens to do her bodily harm unless she pays him so much money. Often she is charged with saying something derogatory to him. She is then made to pay for "defamation of character." She pays in order to escape bodily harm at the hands of husband. Often enough the charge is true, but often it is not. In either case he gets money from her.

Money is lent at the uniform rate of ten per cent. It is the custom on Duke of York, that when a person wishes to borrow money he must return eleven fathoms for ten fathoms borrowed. The word for interest there is *wawaturu*, thus showing that the idea of usury is perfectly understood. On New Britain the idea is not so fully developed. I have not found on New Britain a word equal to the Duke of York word *wawaturu*. *Kumbika* is the New Britain word which most resembles the Duke of York word. Its literal meaning is either a present, or to present, to give, to pay. When money is borrowed, however, it is never returned without a fathom for every ten fathoms borrowed, but the idea in the native mind does not seem to be so much interest, as an expression of thanks for the favour. It amounts practically to the same thing, but there is a difference in the native mind.

A New Britain native has an aversion to breaking in upon his capital. If a man has a coil of money but no "change," and requiring for his present need only a few fathoms, he will take his coil and pawn it for as many fathoms as he requires. The coil is kept by the lender until the sum is repaid with interest upon which the coil is returned to its owner. This custom is called the *vuvuring*.

The people greatly deplore the loss of this wealth from the community and will do much to avert it. If a rich man is offended and threatens to remove to another town, his friends and sometimes many of the leading men of the place will pay him something to remain with them.

One man often becomes a banker for a number of men. He is generally a man who is feared and who has a reputation for valour and a good following. His house then forms a rallying point in times of trouble for all those who have lodged money there. He thus becomes a person of influence and power, because, no matter what villany he may perpetrate, the depositors rally round their money to defend it, and in so doing defend him. I do not know that he is held responsible for anything which may be missing. I have known cases where the banker has been offended by one of the depositors, and he has refused to give back the deposit, claiming it as compensation for the offence. Being feared by the offender, nothing has been done. I have also known young men deposit money with their uncle, *i. e.*, their mother's brother, and the uncle has used the money as his own. There seems to be no redress in that case. I have never heard of any banker using or making away with or retaining money belonging to others except in the above cases.

A borrower comes more or less under the influence and power of the lender. If the borrower is a young man and has borrowed money to purchase

a wife, or if a person has purchased a wife for him, he is then more or less at the bidding of the lender until the loan is repaid. All initiation fees into various clubs or societies are, as a rule, paid by the elders or chiefs, thus bringing the boys and young men under their influence. If a borrower shows a disposition to be restive, he is at once reminded of his obligation to pay, and the "screw" is as powerfully applied as with us. If a man refuses to repay a loan, he is thenceforth a marked man. His character is gone. He is called a "*watukum*," meaning an embezzler. None will lend him money in the future. Some young men cannot marry for the simple reason they cannot purchase a wife, and no one will lend them money because they are lazy, or have not been able to make money in the past, and there is a doubt as to whether they will be able to make it in the future.

Partnerships are entered into by the people. Two or three will own a fishtrap or a number of them, or perhaps a large fishing net. The proceeds of the sale of the produce are carefully counted at the conclusion of the day's work and equally divided, or it may be the profits are divided at the end of a season. Trading and other ventures are jointly carried on and strict accounts kept, each partner being a check on the others. The strength of their memory in money matters is astonishing. Large plantations are made by a number of people and the produce sold. The greatest source of wealth to the coast tribes lies in their trading for the shell of the Tambu, and in the products of their fishtraps and plantations.

Atonement of Wrong is made by the payment of Tambu, the amount fixed being according to the wrong done. This fact has a great restraining influence upon New Britain society. Thus:

When war has been carried on for any length of time, and persons have been killed or injured, no peace can be made until the friends of the killed and wounded, in the latter case the wounded themselves, have received compensation from the enemy. Each side must pay the other for damage inflicted. This reciprocal payment, if I may so call it, is shown in the word used to express both the act and the action. On Duke of York it is *wekul*. On New Britain it is *warakul*. *Kul*=buy, pay: the *we* on Duke of York, and the *wara* on New Britain denotes reciprocal action. Thus, *wekul* and *warakul* literally mean paying each other. The side which was originally wronged receives any sum mutually agreed upon in satisfaction of the original wrong out of which the war sprang, in addition to payment for whatever injury may have been inflicted during the fighting. This money is paid, not out of any public fund, but by the parties principally concerned. While so much as a single wound is not atoned for, peace cannot be considered likely.

Because of the lack of all constituted authority among the people, simple and ordinary quarrels lead to serious ones. There is no one man vested with power or authority who can say "cease," when any quarrel has reached a certain stage. All peace is arranged by common agreement, mutual consent, not by personal authority. Take the following example:—

To Meli and To Delu were two boys. To Meli put an iron ramrod into the fire, and when it was hot he drew it across To Delu's bare back. To Delu was incensed at this, and at once ran to the beach and cut down some crotons belonging to To Rumu. To Rumu was angry at the loss of his crotons, and he went along the beach and smashed a canoe belonging to another man. The owner of the canoe went and broke two canoes belonging to another man. The owner of the two canoes burnt down another man's house, and even more mischief still sprang out of To Meli's practical joking. All now thought that the matter should be settled. To Meli had to pay To Rumu for the crotons which To Delu had cut down, because by burning To Delu he had been the cause of the crotons being cut down. To Delu who had been burnt, had to pay for the broken canoe, because he, by cutting down the crotons, had caused the canoe to be broken. To Rumu by breaking the one canoe had caused the two canoes to be broken, and so he had to pay for them. The man who smashed the two canoes caused the house to be burnt down so he had to pay for that. So every account had to be settled until they found a man whose property had been injured, but who had injured none in return. His claim would then be paid and the matter ends. It will be seen that the boy who was burnt got nothing for the injury done to him. However, by cutting down the crotons he had forced To Meli to pay for them, and in causing him to lose money by such payment he found a little satisfaction; he had also involved others in loss of property which caused them to be angry with To Meli, whose position was an unenviable one for some time after. . . .

All claims are adjusted by the popular voice, *i. e.*, all have a voice in the settlement. A violent man however, may frighten an offender into paying an extravagant price. As a rule, when atonement is made, the price of an article destroyed is fairly met. It sometimes happens that the injured suffer considerable loss. Women and young people who are not well backed by their friends will nearly always lose. Apart from force, there is little or no justice. Public opinion is a great factor in the adjustment of all disputes, but, as already shown, a violent man may over-ride all public opinion.

The manner in which public opinion is appealed to is as follows:—

The people live in families, *i. e.*, father and mother with their children, and as many of their kinsmen who may wish to live with them; each family or kinsmen having separate houses of their own, and all the houses may be enclosed by one fence, or each house may have its own fence, but erected very close to each other. Hence if one member is injured, all the family know it at once. If kinsmen are living at a distance they are informed as soon as possible of the occurrence. A man's own kin are bound to stand by him even though he be altogether in the wrong. They gather together and make a great noise, shouting and threatening the wrong-doer. This attracts the attention of the neighbours who run together to see what is the matter. The injured man and his kinsmen, together with their following, which may include as many as like to see a row, go near the place where the offender lives, and

send one of their number to him and his friends (who have gathered together, on the first sign of a disturbance) with terms of settlement. It may take hours to arrange the terms, two or three messengers continually going to and fro between the parties, until the affair is settled. There is no lack of communication. All the townsfolk, not personally concerned in the quarrel, are ready for the office of go-between, and seem very happy in being so employed. One, or perhaps two or three of them, may be selected, but these are recognised by both parties as fully accredited; but they have no power to dictate terms of peace. They are simply messengers from one party to the other, and the parties themselves must decide whether the terms proposed are to be accepted or rejected. The initiative is always taken by the injured person if he is able, if not then by the nearest kinsman who may be present. In the case of a woman or a child being injured, the husband, uncle (*i. e.*, mother's brother), father, or nearest kinsman or kinsmen present, take the matter up on their behalf.

The principal parties on either side are, of course, the injured person and the wrong-doer, but they are considerably influenced by their friends and following, though if the offended man chooses to accept the compensation offered, he may do so even against the advice of his friends. The affair generally takes the form of a haggling bargain. A is injured by B. He sends a go-between to B with the message that he will be satisfied with, say, ten fathoms of Tambu. B gives the messenger five fathoms. This is rejected and the money goes back. B adds a little more, and this is repeated until he sends his ultimatum, that he will not give another shell. This is generally accepted, but if not, any of the methods of redress already mentioned may be resorted to.

If the quarrel cannot be settled without a fight, either party can obtain the help of a number of men by paying them for it, while the neutrality of any influential man, who is supposed to be likely to favour the other side, may be secured by a sufficient bribe. This is called *viar ia* = "tying or binding him." . . .

The possession of Tambu has a very important influence on the lives of the New Britain people. Thus:—

It establishes personal right to property, and the right to alienate that property by sale or gift independent of anyone else. The whole town or family may be against the sale or gift, but has only the power to protest and cannot prevent it if the person is determined to sell. This right extends even to women and children. The writer has purchased land (for mission purposes) from women who insisted upon selling even against the wish of their friends. The sale completed, its validity has been recognised. I have known persons who have objected to the sale of a thing make a present to the owner of a fathom, and sometimes more, of Tambu to induce the owner not to sell. A native generally listens to that argument.

It makes the people frugal and industrious. No man is held in greater contempt than a spendthrift. In point of fact such a person is scarcely known.

Nothing is wasted. In purchasing, a man will only buy just as much of anything as he requires for the time being. Hence we see no wholesale business done. One venture at a time is the business maxim of the New Britain people. Plantation produce is the one source of wealth for the inland people. A bunch of bananas will bring, according to size, from a quarter to a whole fathom of Tambu. Cocoa-nuts from sixty to one hundred per fathom. Hence the inland people are nearly always at work at their plantations. They are either in them, or preparing something in connection with them, or selling the produce. Market is held on the coast every third day in a large number of places. Those who live very far back inland have their inland markets where they sell to those nearer the beach, who in turn sell what they buy to the coast people. These markets are so arranged that two are seldom held near each other on the same day. A man taking his produce to one market to-day, may take more to another to-morrow if he is so disposed, and it is safe for him to do so. The coast people meet the inland people at these markets with their fish and articles of European manufacture, and either sell them for Tambu or barter for food and other things only obtainable in the country.

On the coast, fishing, in addition to plantations, is a source of income. The fishtrap is unique, and takes two or three weeks to make, and when finished it is quite a work of art. It costs in all, including the cost of food and wages for those who assist, and the cable to anchor it by—often 500 fathoms long—about six or seven fathoms. Men work from early morning till late at night making these traps. By the time the traps are made plantations require attention. Only those who know nothing about the New Britain people will call them lazy. After a residence of nearly eight years among them the writer has arrived at the conclusion that, comparatively speaking, they are as busy as Europeans are. There are and have been parts of Duke of York, New Ireland, and New Britain where enforced idleness and therefore want and wretchedness existed in the most debasing degree. But when Christianity has stepped in and made peace where peace was scarcely ever known, idleness gave place to industry and wretchedness to comparative comfort and wealth. The innate industry of the people shone forth the moment property and life became in any degree safe. I have known a man make fifty fathoms of Tambu during the fishing season, and ten or twelve fathoms from his plantations.

It makes them a commercial people. By the aid of intermediaries their commercial transactions extend to places they have never visited. But they never, or very seldom, trust their money with the intermediary. He buys the article with his own money and sells it to them for theirs, making what profit he can by the transaction. In the old heathen days Kinawanua people, a town on Duke of York Island, could go to one town on New Ireland and there trade for goods from that place and sell their own. Waira, another town, had its place also. Nakukuru people could cross over to three places on New Britain and do their trading. It is needless to say that through the establish-

ment of mission stations in each town, trade is now carried on between New Britain and other parts of the group with almost perfect freedom. A bargain once made and concluded is seldom or never disputed. All disputation and haggling is done previous to the conclusion of the bargain.

While Tambu has brought some benefit to the New Britain people it has not been an unmixed blessing. To it, or rather to love for it, may be attributed in no small degree their intense selfishness and their glaring ingratitude. The expression of gratitude often leads to a little expense. Hence gratitude is too expensive a luxury for a New Britain man to be acquainted with. A spirit and life which is unselfish must often suffer loss. A New Britain man cannot afford that. A people whose greatest love is reserved for money, and whose highest aim is to get money, is an exceedingly hard-hearted and an intensely selfish people.

There are other matters closely connected with this shell-money. Its influence is supposed to extend even to the next life. There is not a custom connected with life or death in which this money does not play a great and a leading part.

40. IFUGAO LAW¹

By R. F. BARTON

SOURCES AND STATUS OF IFUGAO LAW

The Ifugaos have no form of writing: there is, consequently, no written law. They have no form of political government: there is, therefore, no constitutional or statutory law. Inasmuch as they have no courts or judges, there is no law based on judicial decisions.

Ifugao law has two sources of origin: taboo (which is essentially religious) and custom. The customary law is the more important from the greater frequency of its application.

Relation of taboo to law.—The Ifugao word for taboo is *paniyu*. The root, which appears under the varying forms *iyu*, *iho*, *iyao*, and *ihao*, means in general "evil" or "bad." The prefix *pan* denotes instrumentality or manner. The word *paniyu* means both by derivation and in use, "bad way of doing," or "evil way." By far the greater number of taboos have their origin in magic. A very large number of them concern the individual, or those closely related to him by blood ties, and for this reason have no place in a discussion of law. Thus a pregnant woman may not wear a string of beads, since the beads form a closed circle and so have a magic tendency to close her body and cause difficult childbirth. This, however, is not a matter that concerns anybody else, and so could be of no interest at law. It is taboo for brothers to defecate near each other, but only they are harmed thereby, and the matter is consequently not of legal interest.

The breaking of a taboo that concerns the person or possessions of an individual of another family is a crime. The following instances will illustrate:

In nearly all districts of Ifugao it is taboo for persons of other districts to pass through a rice field when it is being harvested. It is also taboo for foreigners to enter a village when that village is observing its ceremonial idleness, *tungul*, at the close of harvest time. One who broke this taboo would be subject to fine. In case it were believed that the fine could not be collected, he would be in danger of the lance.

It is taboo to blackguard, to use certain language, and to do certain things in the presence of one's own kin of the opposite sex that are of the degrees of kinship within which marriage is forbidden or in the presence of another and

¹Extracted from pages 11 to 105 of R. F. Barton, "Ifugao Law," *University of California Publications in American Archaeology and Ethnology*, volume 15, part 1, 1919.

such kindred of his, or to make any except the most delicately concealed references to matters connected with sex, sexual intercourse, and reproduction. Even these delicately concealed references are permissible only in cases of real necessity. The breaking of this taboo is a serious offense. One who broke the taboo in the presence of his own female kin would not be punished except in so far as the contempt of his fellows is a punishment. In Kiangnan, before the establishment of foreign government, breaking the taboo in the presence of another and of his female kin of the forbidden degrees is said to have been sometimes punished by the lance.

It is taboo for one who knows of a man's death to ask a relative of the dead man if the man is dead. The breaking of this taboo is punishable by fine. . . .

A third person may make no remark in the presence of kin of the opposite sex as to the fit of the girl's clothing; as to her beauty; nor may he refer to her lover, nor play the lover's harp. Many ordinary things must be called by other than their ordinary names. Even the aged priests who officiate at a birth feast must refer in their prayers to the foetus about to be born as "the friend" and to the placenta as "his blanket." A great number of things are forbidden in the presence of kindred of opposite sex that would not shock even the most prudish of our own people. The third taboo seems to be aimed against the bandying or the taking in vain of the name of the dead. . . .

General principles of the Ifugao legal system.—Its personal character. Society does not punish injuries to itself except as the censure of public opinion is a punishment. This follows naturally from the fact that there is no organized society. It is only when an injury committed by a person or family falls on another person or family that the injury is punished formally.

Collective responsibility.—Not only the individual who commits an act but his kin, in proportion to the nearness of their kinship, are responsible for the act. Their responsibility is slightly less than his. This applies not only to crimes but to debts and civil injuries.

Collective procedure.—Legal procedure is by and between families; therefore a family should be "strong to demand and strong to resist demands." A member of an Ifugao family assists in the punishment of offenders against any other member of his family, and resists the punishment of members of his family by other families. A number of circumstances affect the ardor with which he enters into procedures in which a relative is concerned and the extent to which he will go into them. Among these are: (a) the nearness or remoteness of his relationship to the relative concerned in the action; (b) relationship to the other principal in the action; (c) the loyalty to the family group of the relative principally concerned in the procedure and the extent to which this relative discharges his duty to it; (d) evidence in the case bearing on the correctness of the relative's position in the controversy.

A corollary of the above principle.—Since legal procedure is between families, and never between individuals, nor between a family and an individual, crimes of brother or sister against brother or sister go unpunished. The family of

the two individuals is identical. *A family cannot proceed against itself.* But in the case of incest between a father and a daughter the father might be punished by the girl's mother's family on the ground that he had committed a crime against a member of that family. It is true that just as great an injury would have been committed against the family of the father, since the relationship of the daughter to that family is the same as to her mother's family. But the father, the perpetrator of the crime, being a nearer relative of his own family than his daughter, his family certainly would not take active steps against him. Were the crime a less disgraceful one, the father's kin would probably contest his penalty.

The family unity must at all hazards be preserved.—Clemency is shown the remoter kin in order to secure their loyalty to the family group. A large unified family group is in the ideal position of being "strong to demand and strong to resist demands." The family is the only thing of the nature of an organization that the Ifugao has, and he cherishes it accordingly.

Collective reciprocity of punishment.—Just as the family group is collectively responsible for the delinquencies of its members, but in less degree than the delinquent himself, so may punishment be meted out to individuals of the group other than the actual culprit, although naturally it is preferred to punish the actual culprit; and so may debts or indemnities be collected from them. But only those individuals that are of the nearest degree of kinship may be held responsible; cousins may not *legally* be punished if there be brothers or sisters. . . .

GO-BETWEENS

The go-between.—No transaction of importance of any sort between persons of different families is consummated without the intervention of a middle man, or go-between, called *monbaga* (bespeaker) in civil transactions; and *monkalun* (admonisher) in criminal cases.

Go-betweens are used commonly in (a) buying and selling of family property of whatever kind or value; (b) buying and selling of animals and the more valuable personal property, except chickens, and in some cases pigs; (c) the borrowing of money or other wealth; (d) marriage proposals and the negotiating of marriage contracts; (e) collection of debts; (f) all steps connected with the *balal*, such as pawn of rice fields, or their redemption; (g) demands for damages to property or persons; (h) the buying back of heads lost in war, the ransoming of the kidnapped, or the making of peace.

The go-between is the principal witness to a transaction. For his services he receives pay which is fixed to a fair degree of exactness for a particular service. This pay ranges from a piece of meat to a fee of twenty or twenty-five pesos.

Responsibility of go-betweens.—Go-betweens are responsible to both parties to a transaction, for the correct rendering of tenders, offers, and payments.

Their word binds only themselves, however—not their principals. Go-betweens are not agents of one party more than another. They are supposed to be impartial, and interested only in consummating the transaction involved in order to get their fee.

Thus, suppose that A sends B as a go-between to sell a field to C, a man of another district. B finds that he cannot sell the field for the price A asked for it, and, anxious to consummate a sale and so collect his fee, he agrees to sell the field to C for a lower price than that asked by A.

In such a case as this, B is responsible to C in case A refuses to abide by C's agreement to sell. C has the right to collect damages.

The oriental propensity to "squeeze" is proverbial. It is condoned in law—one might almost say legitimized, provided it be not found out. Thus:

A sends B to Nueva Vizcaya to buy a carabao. The regular commission for this service is ten pesos, the agent to deliver a living carabao to the principal, and to be responsible for the value if the carabao die on the route. This, the usual agreement, holds between them. A furnishes B with eighty pesos with which to purchase the animal. B returns with the animal, representing that he paid seventy pesos for it, when, as a matter of fact, he paid out sixty pesos, thus gaining ten pesos "squeeze."

If A finds out that B paid only sixty pesos for the carabao, the only thing he can do is to collect the ten pesos difference between what A paid and what he said he paid. He cannot assess punitive damages.

Conditions relieving a go-between of responsibility.—An act of God or the acts of a public enemy relieve a go-between or an agent from responsibility. Thus an agent sent to purchase an animal in *baliwan* (the stranger country) is under obligation to deliver it alive. But if it be struck by lightning, or if the carabao be taken away from him by enemies, and he has a wound to bear witness that he offered due resistance to them; or, in case he has no wound, if he has witnesses or good proof of the fact that the enemy was so superior in force as to make resistance foolhardy, he cannot be held for payment of the animal

PENALTIES

The Ifugaos have two punishments for crime: the death penalty and fine. These punishments are inflicted and executed by the offended person and his kin.

Nature and reckoning of fines.—Fines are of two sorts: fines of "tens," *bakid*, and fines of "sixes," *na-onom*, each unit of the ten or six being a portion of the whole fine. The different parts of the fine go to different people. Often-times sticks, knots, or notches are used to assist in calculation. In Banaue and neighboring districts these aids to calculation are also kept as a record. The unit payments grow successively smaller from the first to the last.

The first unit of any series is called *pu-u*, meaning "base." It is of the greatest value, and goes to the injured individual. The second payment,

sometimes, goes to the go-between. In that case, the kin of the injured man take all the rest. If the fee of the go-between be provided for outside of the fine, the kin of the injured man take all except the *pu-u*, the first unit. This is but just, since they have backed their kinsman in his action against the offender, have perchance risked their lives in his cause, and also stand ready at all times to help pay any fines that others may assess against him.

The second, and sometimes the third and fourth units, are called *haynub di pu-u*, meaning "followers of the base." They are of less value than the *pu-u*. Then follow units consisting, each, of four irons (spear-heads, axes, knives). These units are called *natauwinan*. Then come units of three irons each, called *natuku*; then units of two irons each, called *nunbadi*; then units of one iron each, called *na-oha*. In the case of fines composed of six units, there is usually no *haynub*.

The Malay does nothing without first thoroughly talking it over. After a payment has been tentatively consented to by the offender and his family, there yet remain many conferences with the go-between before everything is arranged. An uninitiated white man on seeing a group of these people, squatted in a circle, moving little sticks about, and in heated discussion, might think they were playing some primitive but absorbing native game. And, I am not sure that the attitude of their minds is very different! . . .

CIRCUMSTANCES WHICH AFFECT PENALTY

Certain circumstances, namely, criminal responsibility, alienship, kinship, confession, and the relative rank of offender and offended, affect penalty, either as to its severity or as to the likelihood of its being inflicted at all.

Moral turpitude not a factor.—Moral turpitude, which plays no small part in our own law in determining punishment, seems not to enter into the consideration of Ifugao law. Thus, such crimes as incest between brother and sister, parricide, matricide, fratricide, and treason against one's family, all go unpunished. Even the betrayal of a co-villager into the hands of the enemy subjects the offender to only a third degree of likelihood of being punished. These crimes probably go unpunished in accordance with the following correlated fundamentals of Ifugao society: Legal procedure is conducted by and between families; the family unit is the most precious thing in Ifugao social life; *family unity must, at all hazards, be preserved*. In the case of a murder accomplished by treachery, as for example, the killing of a guest, the moral turpitude involved might perhaps hasten punishment—it might even increase its severity in that the kin of the murdered person might retaliate on a greater number of those concerned in the murder. But such an abuse of hospitality appears never to have occurred.

Another reason why what we consider moral turpitude does not enter into punishment is that treachery, ambush, and accomplishment by superior force are the rule, not only in commission of crime, but also in perfectly legal capital executions and seizures of property.

PENAL RESPONSIBILITY

As between principals and their accomplices and accessories, Ifugao law recognizes only gradations in likelihood of punishment. The penalty is the same for all of them; but very frequently the offense is considered as having been expiated by the punishment of those whose responsibility for it is greatest, and the rest go free.

The nungolat, or principal.—The *nungolat* (he who was strong) is the conceiver, planner, and director of an offense. He may or may not take an active part in its commission. Whether or not he does so, he is considered to be responsible for it in the highest degree. He is, of all who take part in the offense, the most likely to be punished.

The following example, continued through several succeeding sections, shows the various degrees of criminal responsibility, and the corresponding degrees of likelihood of punishment:

A decides to avenge the death of a kinsman. He consequently calls a number of his kinsmen and proposes a war expedition to take the head of Z, an enemy concerned in the death of the murdered kinsman, in another village. They agree. A calls the family priests to his house to perform the necessary religious preliminaries to setting out on a head-hunting expedition. The ceremonies are performed, and the omen of the bile sac promises well. But, just before starting, some accident happens to A, which the priests attribute to the sorcery of the enemy. A consequently does not accompany the expedition. He is, notwithstanding, the *nungolat*, and is more likely to be the object of vengeance than any other, should the crime be accomplished.

The tombok, or "thrower."—In offenses in which a spear is thrown, he who throws the effective spear is called the *tombok*. His responsibility for the crime is second to that of the *nungolat*, as is also his likelihood of being punished.

Iba'n di nungolat, the "companions of the one who was strong."—Those who assist in the commission of a crime by reinforcing, accompanying, assisting, backing, giving aid and comfort to the committer thereof, or furnishing anything needful to the consummation of the crime incur the next lesser degree of criminal responsibility and of likelihood of being punished to those of the conceiver and committer of the crime.

The montudol, "shower," or informer.—One who gives a person in the act of committing a crime information necessary to the successful carrying out of his intent, is guilty in the same degree as are persons of the preceding paragraph.

Thus, continuing the illustration started above, suppose that B, C, D, E, F, G, H, and I go to take the head of A's enemy and theirs. They meet O, a co-villager of Z, the man whose head they want to take, and ask him regarding Z's whereabouts. The fact could not be otherwise than patent to O, that a head-hunting party was addressing him. He answers truthfully that

Z is in his sweet-potato field, and that the party may reach the field by such and such by-path without their being seen by Z's kin or co-villagers. The party follows O's directions. B spears Z.

B is the *tombok*; C, D, E, F, G, H, and I are the "companions of the one who was strong," and O is the *montudol*. . . .

The relation of intent to criminal responsibility.—*Gulad* or intent, is probably the greatest single factor in determining penal responsibility. Thus:

A deed committed without intent, and without carelessness, is excused. One has not, usually, even to make restitution for the injury done. Thus, in the case of a bolo flying out of a man's hand, and putting out the eye of another, no damages were assessed. An enormous number of men, every year, are injured in the free-for-all scrambles over sacrificed carabaos. Many of these injuries result in stiff joints; some of them in deaths. In no case, not even in the case of death, is a payment demanded. Suppose that in the chase a number of hunters have surrounded a wild boar. The boar charges one of them. This man leaps backward, and, at the same time, draws back his spear to throw it at the boar. In so doing, he stabs a companion behind him with the shod end of the spear handle. This is not an uncommon accident. The others of the party are witnesses that the killing was purely accidental (*naloktat*). No fine is assessed; but the killer, to show that he is sorry, usually assists in the funeral feast. Of course, if there were no witnesses, and if there were a possible motive to complicate matters, the ending of the case might not be so happy.

Suppose that a number of men are throwing at a target with their spears. A child runs in the way, and is killed. One-half the usual fine for manslaughter is assessed on the ground that the thrower was careless in that he did not make sure before he threw the spear that such an accident could not occur. In this case there was an absence of intent; but carelessness was present.

A man kills a neighbor at night, acting under the impression that he is killing an enemy seeking his life. He is subjected to a much heavier fine than if he had killed him through carelessness, since there is present both the intent to kill, although not criminal, and carelessness in that he did not make sure at whom he was casting his spear. . . .

Rank and standing in the community.—This is probably the greatest single factor in determining the severity of punishment in cases where a crime is punishable by fine. But the aggressiveness and the war footing of the two parties to the controversy enter even here to an astounding degree.

In the Kiangnan-Maggok area, there are three grades of fines—the highest for the punishment of crimes of one *kadangyang* or rich man, against another; a medium grade for crimes of persons of the *tumok*, or middle class, against each other; and a third and lowest grade for the *nawatwat*, the poverty stricken. Each lower grade of fine is a little more than half the next higher one.

In the Kababuyan area, there are five grades of fines—one for the very rich, one for the fairly rich, one for the middle class, one for the poor, one for the poverty stricken. In Sapao and in Asin, there are four grades.

So long as both offender and offended are of the same class, there is no trouble about determining the fine proper in a given case. But when they are of different classes, the case is not so simple, and the factors of fighting strength and personality enter.

Suppose that R, a rich man, commits adultery against P, a poor man. P sends a go-between to demand the highest grade of fine for this crime—that is, the grade which *kadangyang* pay. R does not deny the crime, but states that he considers the payment of the fine that is due one rich man from another preposterous. He states that he is willing to pay the fine proper to the poorer class. To this P replies that he did not begin this action for the purpose of getting money, but for the purpose of so punishing R as to make a repetition of the crime improbable. There are three possible endings in such a case:

(a) P's kin represent to him that they cannot afford to have war with R; that R's people hold a lot of debts over their heads; that should R prove obdurate, and should the affair end in a lance throwing, R's people would wipe them off the earth. They advise P to be satisfied with the lowest grade of fine. He agrees.

(b) P and R compromise on the grade of fine that is midway between their stations; that is, the fine of the middle class. In Kiangnan this is the usual settlement.

(c) P shows such *bungot* (wrath and ferocity) that R's kin advise him to pay the larger fine. They point out that the fine is a small matter as compared with the loss of life, and state that there is no telling what this poverty-stricken but rampant dog will do. This settlement is not uncommon in the Kiangnan area, where the poor people have a great deal of pride and bravery, but rare in other parts of Ifugao.

Aside from other matters, the diplomacy and tact of the go-between would have a great deal to do toward determining which of these contingencies would result.

It is extremely hard to make a general statement as to fines when offender and offended are of different classes. It may safely be said that the fines assessed average the amount midway between the fines proper to the two classes concerned. Thus, when a poor man offends a rich man, and when a rich man offends a poor man, the average of the fines assessed equals approximately the fine assessed for injuries within the middle class. In questions in which rich and middle class persons are involved, the fines approximate an amount half way between the fines of the rich and of the middle classes.

Importance of influential position and personality.—The fact has already been mentioned that Ifugao administration of justice is remarkably personal in nature. We have just seen to what an extent personality and war-footing enter into the infliction of fines when offender and offended are of different classes. Nowhere can a man of magnetism and force reap greater benefit from these qualities, relatively speaking, than in an Ifugao controversy. The fact stares us in the face in every phase of Ifugao law, especially in procedure. . . .

THE TAKING OF LIFE

The Ifugao has one general law, which with a few notable exceptions he applies to killings, be they killings in war, murders, or executions, which public opinion would pronounce justifiable and legal. That law is: *A life must be paid by a life*. Let us pass now to a consideration of various classes of the takings of human life.

Executions justifiable by Ifugao law.—Public opinion or custom, or both, justify the taking of a life in punishment for the following crimes: sorcery; murder; persistent and wilful refusal to pay a debt when there is the ability to pay; adultery discovered *in flagrante*; theft by one of a foreign district; refusal to pay a fine assessed for crime or for injury suffered. But even though custom and public opinion justify the administration of the extreme penalty in these cases, the kin of the murdered man do not, in most cases, consider the killing justified. There are innumerable circumstances that complicate a given case. Was the sorcery proven or only suspected? Was it a murder that the man committed; or was he justified in the killing? Would not the debtor have come to his right mind had his creditor waited a little longer; and did the creditor approach him in the right way with reference to the debt? Did not the woman make advances in the adultery case that no self-respecting male could turn down? Was not the indemnity assessed too large or otherwise improper; or did the injured party wait long enough for the payment? These and a thousand other questions may arise with respect to the various cases.

If the death penalty be inflicted by persons of a foreign district, it is sure to be looked upon as a murder.

At feasts and gatherings about the "bowl that cheers" and especially in drunken brawls, an unavenged killing, no matter what the circumstances, is likely to be brought up as a reflection upon the bravery or manhood of the living kin, and so urge them to the avenging of what was really a justified execution.

Murder, sorcery, and a refusal to pay the fine for adultery justify the infliction of the death penalty even on a kinsman if he is not too close a relative. An execution of one kinsman by another is not so likely to be avenged as is justifiable execution by one outside the family. . . .

Hibul or homicide.—The Ifugao law clearly recognizes several grades of homicide.

(a) The taking of life when there is an entire absence of both intent and carelessness. As for example, in the case already cited, when a party of hunters have a wild boar at bay. The boar, as there stated, charges the most advanced of the hunters, and in retreating backwards, the latter jabs one of his companions with the shod point of his spear handle. There is no penalty for such a taking of life.

(b) The taking of life when there is clearly an absence of intent, but a degree of carelessness. For example, a number of men are throwing spears at a mark. A child runs in the way, and is killed. The penalty is a fine varying from one-third to two-thirds the amount of the full fine for homicide according to the degree of carelessness.

(c) Intentional taking of the life of another, under the impression that he is an enemy when in reality he is a co-villager or a companion. In case the killer can make the family of the slain understand the circumstances, only a fine is assessed. This fine is called *labod*. If the killer be unrelated to the slain, the full amount of the *labod* is demanded; if related, the amount is usually lessened.

Example: Dumaawat of Baay was irrigating his fields at night. Some of his companions told him that there were some head-hunters from an enemy village near. In the darkness, Dumaawat encountered another man, Likyayu, the betrothed of his daughter. He asked him who was there. On account of the noise of water falling from the rice fields, Likyayu did not hear the inquiry, and said nothing. Dumaawat speared him. Likyayu cried out. Dumaawat recognized his voice, and carried him home. He furnished animals for sacrifice to secure Likyayu's recovery. Likyayu recovered. Had he died, Dumaawat would have been called on for the full amount of the fine; but had Likyayu been *firmly* engaged to Dumaawat's daughter, that is, had the *bango* ceremony been performed the full amount of the *labod* fine would not have been demanded, since the relationship would have been an extenuating circumstance.

(d) The taking of life by persons in a brawl or by an intoxicated or insane person. In case the slain died before his slayer could agree to provide animals for sacrifice, the latter would probably be killed by the kin of the slain if he were of a foreign district. He might be killed if a non-related co-villager. He would be fined the *labod* if a kinsman. He would probably go scot free if a brother or uncle.

Example: A of Longa became insanely drunk at a feast at the house of his brother Gimbugan. He attempted to embrace the comely daughter of Gimbugan, his niece. Gimbugan tried to quiet him, and in so doing aroused his ire. He drew his spear menacingly, and in so doing pierced the girl—who was at his back—with the shod point at the end. She died. A was properly penitent when he sobered, and furnished animals for sacrifice. The fine was *labod* was not, however, demanded of him. This was about thirty-five or forty years ago. Considerable feeling exists between the two branches of the family to this day, owing to this occurrence.

The burden rests upon the slayer in the above cases to show that the killing was accidental or that he was so drunk as to have utterly lost his reason. The absence of a motive is a great help to him in this. If he has ever had a serious altercation with the slain, in the absence of controverting evidence, the presumption is likely to be that the killing was intentional, and that he has been "feigning friendship in order to kill by *ugâ* (treachery)." . . .

Special liability of the givers of certain feasts.—The givers of *uyauwe* or *hagabi* feasts (glorified general welfare feasts to which great numbers of people come) are responsible for wounds or deaths that occur at these feasts. When a man decides to initiate himself and his wife into the ranks of the *kadangyang* by giving one of these feasts, he appoints one of the old priests of his family to perform the *tikman* ceremonies. These ceremonies are sacrifices to the various classes of deities whose special function is the "tying up" of men's

stomachs and passions. Prayers are addressed to these deities that a little food satisfy the guest that attends the feast, to the end that the giver be not eaten out of house and home; that a little rice wine suffice to intoxicate the people; that the passions of men be tied up to the end that no quarrels or frays occur; that no rice-wine jars or gongs be broken; that no accidents occur—in short, that the whole feast pass off smoothly. The duties of the *manikam* (the priest who performs these ceremonies) are rather arduous. To say nothing of the ceremonies he conducts, he must fast for a number of days and must observe a number of taboos. He receives rather a large fee for these services. And, indeed, their importance, in the eyes of the Ifugaos, and the legal responsibility he incurs, certainly justify a large fee.

The *manikam* priests are jointly responsible with the giver of the feast for accidents or violence that may occur. This liability of the giver of the feast for wounds or loss of life is based on the supposition that if he had not given the feast the wound would not have occurred; and possibly that he gave the feast with the motive of bringing about such an occurrence. The liability of the *manikam* is based on the supposition that there must have been a remissness on his part in his religious duties, else the accident or loss would never have occurred. The following is an actual instance that would indicate that this provision of the law is an incipient employer's liability provision.

Malingan of Pindungan, many years ago, gathered together his kin and friends, performed the preliminary feasts, and went to Payauan to make a *hagabi* (lounging bench, the insignium of the *kadangyang* class.) They made a very large *hagabi* that weighed nearly a ton. In helping to carry it across the river two men were carried downstream by the current and drowned. Demand was made on Malingan and the *manikam* of the feast for the *labod* fine. It was paid, and that is the reason Malingan's descendants are not wealthier today, for formerly Malingan was one of the wealthiest men of the district. . . .

The labod, fine assessed for homicide.—This fine is paid to the family of the slain. For the *kadangyang*, or wealthy class, the full fine consists of ten portions or divisions, totaling 975 pesos in the case tabulated below. . . .

PUTTING ANOTHER IN THE POSITION OF AN ACCOMPLICE

The tokom, or fine for compromising another.—He who, voluntarily or involuntarily, puts another in the position of an accomplice, or in such a light that he might be regarded as being an accomplice in the commission of a crime, and so be liable to punishment as such, must pay the person so injured a fine, called *tokom*. It may almost be said that he who causes another person's name to be prominently mentioned or bandied in connection with a crime must pay this fine.

The following are instances in which a *tokom* would be demanded:

A of another district comes to the house of B, and is received by B as a guest. While he is going home and while he is in the outskirts of the district he is speared by C, a neighbor of B's or a resident of the same district. B must force C to pay a *tokom*.

B steals or illegally confiscates property belonging to A. C sees B in the act. He demands a *tokom*—in this case it may be the bolo or spear that B is carrying—and so puts himself "on record" as not having been an accomplice. But he says nothing about the crime unless it come to light that he was a witness of it. In this case he proves by the *tokom* that he received that he had no connection with it. As a matter of practice it would seem that a gift received from the thief would tend to lead the witness to conceal the crime.

A gives an *uyauwe* feast. At the attendant drink feast B in a drunken brawl kills C. A and the *manikam* D must demand a *tokom* from B in order to clear their reputations. . . .

One who is put in a position in which a *tokom* is due him must collect the *tokom*. It is not sufficient that he demand the payment of it—he must enforce the payment. Otherwise he will be considered by the kin of the injured as having been an accomplice, and liable to punishment accordingly. . . .

THE MONKALUN OR GO-BETWEEN

Nature of his duties.—The office of the *monkalun* is the most important one to be found in Ifugao society. The *monkalun* is a whole court, completely equipped, in embryo. He is judge, prosecuting and defending counsel, and the court record.² His duty and his interest are for a peaceful settlement. He receives a fee, called *lukba* or *liwa*. To the end of peaceful settlement he exhausts every art of Ifugao diplomacy. He wheedles, coaxes, flatters, threatens, drives, scolds, insinuates. He beats down the demands of the plaintiffs or prosecution, and bolsters up the proposals of the defendants until a point be reached at which the two parties may compromise. If the culprit or accused be not disposed to listen to reason and runs away or "shows fight" when approached, the *monkalun* waits till the former ascends into his house, follows him, and, *war-knife in hand*, sits in front of him and compels him to listen.

The *monkalun* should not be closely related to either party in a controversy. He may be a distant relative of either one of them. The *monkalun* has no authority. All that he can do is to act as a peace making go-between. His only power is in his art of persuasion, his tact and his skillful playing on human emotions and motives. Were he closely related to the plaintiff, he would have no influence with the defendant, and *mutatis mutandis* the opposite would be true.

²The word *monkalun* comes from the root *kalun*, meaning *advise*. The Ifugao word has the double sense, too, of our word *advise*, as used in the following sentences, "I have the honor to advise you of your appointment" and "I advise you not to do that."

Ultimately in any state the last appeal is to a death-dealing weapon. For example, in our own society a man owes a debt which he does not pay. Action is brought to sell his property to pay the debt. If he resists, he is in danger of death at the hands of an agent of the law. Much more is he in danger if he resists punishment for crime. The same is true in the Ifugao society. The lance is back of every demand of importance, and sometimes it seems hungry.

An Ifugao's pride as well as his self-interest—one might almost say his self-preservation—demands that he shall collect debts that are owed him, and that he shall punish injuries or crimes against himself. Did he not do so he would become the prey of his fellows. No one would respect him. Let there be but one debt owed him which he makes no effort to collect; let there be but one insult offered him that goes unpunished, and in the drunken babbling attendant on every feast or social occasion, he will hear himself accused of cowardice and called a woman.

On the other hand, self-interest and self-respect demand that the accused shall not accept punishment too tamely or with undue haste, and that he shall not pay an exorbitant fine. If he can manage to beat the demands of the complainant down below those usually met in like cases, he even gains in prestige. But the *monkalun* never lets him forget that the lance has been scoured and sharpened for him, and that he walks and lives in daily danger of it.

The accuser is usually not over anxious to kill the accused. Should he do so, the probabilities are that the kin of the accused would avenge the death, in which case he, the slayer, would be also slain. The kin of each party are anxious for a peaceable settlement, if such can be honorably brought about. They have feuds a-plenty on their hands already. Neighbors and co-villagers do not want to see their neighborhood torn by internal dissension and thus weakened as to the conduct of warfare against enemies. All these forces make for a peaceful settlement.

It is the part of the accused to dally with danger for a time, however, and at last to accede to the best terms he can get, if they be within reason.

TESTIMONY

Litigants do not confront each other.—From the time at which a controversy is formally entered into, the principals and their kin are on a basis of theoretical—perhaps I ought to say religious—enmity. A great number of taboos keep them apart. Diplomatic relations between the two parties have been broken off and all business pertaining to the case is transacted through the third party, the *monkalun*. He hears the testimony that each side brings forward to support its contention. Through him each controversant is confronted with the testimony of the other. It is greatly to the interest of the *monkalun* to arrange a peaceful settlement, not only because he usually receives

a somewhat larger fee in such case, but because the peaceful settlement of cases in which he is mediator builds up a reputation for him, so that he is frequently called and so can earn many fees. To the end of arranging this peaceful settlement, the *monkalun* reports to each party to the controversy the strong points of the testimony in favor of the other party, and oftentimes neglects the weaknesses.

There are no oaths or formalities in giving of testimony.

ORDEALS

Cases in which employed.—In criminal cases in which the accused persistently denies his guilt, and sometimes in case of disputes over property the ownership of which is doubtful, and in cases of disputes over the division line between fields, ordeals or trials are resorted to. The challenge to an ordeal may come from either the accuser or the accused. Refusal to accept a challenge means a loss of the case, and the challenger proceeds as if he had won the case.

If the accused comes unscathed from the ordeal, he has the right to collect from his accuser the fine for false accusation.

If two people mutually accuse each other, *panuyu*, they are both tried by ordeal. If both be scathed, they are mutually responsible for the indemnity to the injured person. If only one be scathed, he is responsible for the indemnity to the injured person and for a payment of the fine for false accusation to the one whom he accused.

The hot water ordeal.—A pot, a foot or more in depth, is filled with water and heated to a furious boiling. A pebble is dropped into it. The accused must reach his hand into the water without undue haste, extract the pebble, and then replace it. Undue haste is interpreted as a confession of guilt. This ordeal is used in certain sections of Ifugao, while in others the hot bolo test is used. It is interesting to note that neither of them is efficacious in determining accusations of adultery. This is for the reason that the gods of animal fertility and growth do not permit an accused to receive an injury for that act which is so eminently useful in their particular sphere of activity. Thus, Ifugao religion looks with the greatest disfavor upon things which tend to restrict population, just as our law frowns upon statutes in restriction of marriage.

The hot bolo ordeal.—In this, if two persons mutually accuse each other, their hands are placed side by side. The *monkalun* lowers a hot knife on their hands. The knife burns the guilty person much more seriously than the guiltless one. If only one person be put to the test, it is said that the knife bends away from the hands of an innocent person. The *monkalun*, with all his might, it is said, cannot put the knife down on the hand: the gods of war and justice will not permit it. But if the person be guilty, the knife grips the hand in its eagerness. If the accused show fear and try to withdraw, the kin

of the accuser may catch him and burn him well. I know a man whose fingers were burned off in this way, the thumb adhering to and coalescing with the palm.

The alao or duel.—Eggs, *runo* stalks, or spears are used in trials, the accused facing each other and, at the word of the *monkalun*, hurling their missiles. The duel is not without its dangers. Even though eggs or *runos* be used, the one struck is likely to return a stone; and from throwing stones to throwing spears is an easy step. The two parties of kin are likely to take a hand. How much more likely are they to take a hand and avenge their kinsman if spears be the missiles and he be wounded!

The duel is used in cases of adultery, sorcery, and in some disputes over rice fields, everywhere in Ifugao. In adultery cases, only eggs are used in the duel.

Trial by bullong or wrestling.—This ordeal is used throughout Ifugao, pre-eminently to settle cases of disputed rice-field boundaries.

The Ifugao clearly recognizes that the processes of nature—landslides, the erosion of rainfall in wet weather, and caking and crumbling in dry weather—tend to wear away a terrace not maintained by a stone wall. A terrace maintained by a stone wall is a rarity in the Kiangnan district. Should the boundary not be well marked by *paghok* a dispute is nearly sure to result sooner or later. These disputes are usually settled by wrestling matches. The wrestling matches are usually friendly. The Ifugao believes that the ancestral spirits of the controversants know which party is in the right, that they know just where the true boundary is, and that they see to it that he who is right shall win, provided always that they be invoked with the proper sacrifices; and that they “hold up” even the weaker of the wrestlers, and cause him to win, provided his cause be just. Notwithstanding this belief, the people are sufficiently practical to demand that the wrestlers be approximately evenly matched. The owners of the adjacent fields may themselves wrestle, or they may choose champions to represent them. Between kinsmen these matches are presumably friendly; and only sacrifices of dried meat are offered the ancestral spirits. But between those not related, there is often a great deal of unfriendly feeling. In this latter case numerous chickens and two or three pigs are sacrificed, and ceremonies like those against enemies are performed.

On the appointed day the two parties meet at the disputed boundary and occupy opposite ends of the disputed land. A party of mutual kin follows along and occupies a position midway between the adversaries. With each party is one of the family priests. Taking betels and dried meat (presuming the contest to be a friendly one) from a head-basket, the priest prays very much as follows: “Come, Grandfather Eagle, Grandfather Red Ant, Grandfather Strong Wind, Grandfather Pangalina; come, Grandmother Cicada, Grandmother Made Happy, Grandmother Ortagon; come, Grandfather Gold, etc. [throughout a list of perhaps a hundred ancestors]. Here are betels and meat; they are trying to take our field away from us. And was it here, Grandmother

Grasshopper, that the boundary of the field was? No, you know that it was a double arm's length to the right. Hold us up, you ancestors, in order that *we* may be the wearers of gold neck-ornaments; in order that *we* may be the ones who give expensive feasts. Exhort [here the priest names over the gods of war and justice] to hold us up. Was it here, Grandfather Brave, that the boundary was when you bought the field? Do not let them take our land away from us, for we are to be pitied. We are sorely tried!"

After the prayers of the priests, each champion is led by one of his kinsman to the place where the first wrestling is to occur. This leading is very ceremoniously done, and suggests the heralding of the champions in feudal days. The dike of the upper terrace has been cleaned off at intervals of fifteen to twenty-five feet in order that the owner of the upper field may have no advantage. The champions frequently work themselves down half-thigh deep in rice-field mud, water, and slime. Catching fair and even holds, they begin to wrestle, encouraged each by the shouts and cries of his kinsmen and by the calling of the old men and old women on the spirits of the ancestors. Each wrestler tries to push his opponent into the territory that that opponent is defending and to down him there. If A throws B in B's field, ten feet from the line on which they wrestle, A wins ten feet of the rice field at that point. Finally, there is a fall that more than likely capsizes one or both of them in the black mud. One point in the boundary is determined. Frequently the lower terrace is eight or ten feet lower than the upper one, but there are no injuries for the reason that the mud is at least two feet deep and is a soft place in which to fall.

At every fifteen or twenty feet along the disputed boundary there is another wrestling match. Sometimes the champions are changed. The new boundary runs through every point at which there has been a fall.

The umpire and the decision.—The *monkalun* is the umpire in trials by ordeal. He interprets undue haste or a faulty performance as a confession of guilt. On the day following the trial by fire or hot water he goes to the house of the accused and examines the hand and forearm. If he finds white inflamed blisters, he pronounces him guilty. In the case of a duel, he pronounces the one struck by the missile guilty. The Ifugaos believe that the gods of war and justice turn missiles aside from the innocent in these duels. For the umpire to be manifestly unfair, would be for him seriously to imperil his own life.

As a matter of fact, a person whose skin is rough, dry, and horny has a great advantage in these ordeals. Since sword climbing and the walking on hot stones and live coals have occurred in other parts of the world, it would seem that a question might be raised whether *state of mind*, or other factors as yet unexplained, may not enter these affairs. . . .

Seizure of chattels.—If a kinsman of remoter kinship than that existing between brothers commit a crime punishable by death, except sorcery or

murder, and obstinately refuse to pay the fine assessed, seizure of his property or part of it is made.

Seizures are made from unrelated persons to cover fines due in punishment of theft, malicious killing of animals, arson, and the minor crimes, also to secure payment of a debt.

The following is a list of the things usually seized: gongs, rice-wine jars, carabaos, gold beads, rice fields, children, wives.

A seizure may be made by fraud or deceit, or it may be made in the absence of the owner of his household, or it may be made by superior force. Considering only the manner of the seizure, there is but one law to be followed: the seizure must be made in such a manner as to leave no doubt as to the identity of him who seizes. Thus if B persistently refuses to pay a fine owed to A, A may go to B's house when there is nobody at home and may run away with a gong. If he leaves his bolo, his scabbard, his blanket or some other personal effect in the house as a sort of a visiting card, his seizure is legal. Or A may go to B's house and, pretending friendship, borrow the gong, representing that he wants to play it at a feast and, having secured possession of it, refuse to return it till the fine be paid. Or suppose that an agent of B's is bringing a carabao up from Nueva Vizcaya, and that the agent has to travel through A's village. A and his friends stop the agent and take the carabao away from him, telling him to inform B that the carabao will be delivered to him when the fine is paid. . . .

Seizure of rice fields.—The seizure of rice fields is practicable only in case the fields are near the village of him who seizes them. For if located in a distant district, the working of the field would be extremely hazardous, and its protection and continuous holding impossible.

Fields may properly be seized for collection of debt or for refusal to pay fines or indemnities. Portions of fields are seized sometimes in disputes as to ownership or boundaries.

Disputes over ownership and boundary come to a head during spading time. One party begins to spade for the next year's crop the land claimed by the other. The other party sticks up *runos*, tied "ethics lock" fashion (*alpud*), along the line which he claims to be the true boundary. The first party then pulls up these *runos*, and sticks down others along the line claimed by it as the true boundary. The issue is joined. The defendant has made his "rejoinder." A *monkalun* is now selected by the plaintiff party, and tries to arrange—and in case of disputed boundaries nearly always does arrange—a means of peaceful settlement, either by compromise or through trial by wrestling. Sometimes the ownership of a field itself is in question. Usually the question is one of inheritance; although there are a number of other causes that may give rise to dispute. Ownership is usually peaceably settled by means of a wrestling match. . . .

Enforced hospitality.—Sometimes a creditor and a numerous and powerful following of kinsmen descend upon a debtor's house as unwelcome guests, consume his stores of food, and force his hospitality until appeased by the payment of the debt.

This form of collection can only be used in the case of debts, for in all other controversies, taboos forbid the eating of the adversary's food, drinking his water, chewing his betels, etc. Even in the case of debt, if a go-between has been sent to the debtor, this means may not be used. It can only be used in a case where "diplomatic relations" have not been ruptured. . . .

Cases illustrating seizure and kidnapping.—Kodamon of Pindungan and Katiling of Ambabag had a dispute over the boundary of a field. There were *paghok* to mark the boundary, but Kodamon contended that all memory of the planting of the *paghok* was absent, and that they were, consequently, without significance in the matter of dispute. They wrestled, and Kodamon lost a little ground, but Katiling tried to take more than was due him according to the verdict of the wrestling matches. Katiling sent men to spade the disputed territory, and led an armed force out to support them. Kodamon led an armed force to the field. At the same time and at a safe distance, the mutual kin of the two parties and a goodly number of neighbors gathered. Kodamon was armed with a Remington rifle whose trigger was broken; Dulinayan, a kinsman of Katiling, with a revolver for which he had no ammunition. The other members of each force however were substantially, if less spectacularly, armed with spears which they well knew how to use. Women rushed in between the two parties, and catching the warriors by the waist tried to lead them away. One can well believe that the air was riven by curses, threats, accusations, upbraidings, imprecations, invocations. The male neutral kin shouted from their safe distance that if Kodamon killed Katiling, they would kill Kodamon (as a vengeance for the death of their kinsman) while if Katiling killed Kodamon, they would avenge their kinsman's death by killing Katiling. "What kind of a way is this for co-villagers to settle a dispute," they shouted. "Go back home and beget some children, and marry them to each other, giving them the two fields, and then it will make no difference where the division line is!" There was an exchange of spears in which Buaya, a kinsman of Kodamon's, was wounded slightly. The matter was then left in abeyance with the understanding that as soon as possible, the two families be united by a marriage, and the two fields given the married couple.

It happened, however, that on account of the sexes of the unmarried children of the families, a union between them was impossible. Accordingly, Kodamon gave his field to his son Dulnuan, and Katiling traded his field to Pingkihan, his brother. Both of these young men had pregnant wives. Pingkihan's wife gave birth first, the child being a girl. Shortly afterward, Dulnuan's wife gave birth. I met Dulnuan, and not knowing of the event, and noticing that he seemed downcast, asked him why he was so sad. "My wife has given birth to a *girl* baby," he said. The quarrel over the boundary is as yet unsettled.

41. WARFARE OF THE PLAINS INDIANS¹*By* GEORGE BIRD GRINNELL

In early days, after subsistence, the first requirement of life, had been attended to, war was the most important pursuit of certain plains tribes. Among the war customs, two of those best known and most written about are scalping and counting coup. These are very generally misunderstood and are ill defined in the books. It seems the more important to correct existing errors because these customs are no longer practiced and are now known only to old men.

In a periodical, which recently described a collection of Indian clothing and implements, the following words occur:

"In former times, the most notable achievement of an Indian was the taking of a scalp, but with the introduction of rifles the killing of a man became so easy and there were usually so many scalps taken after a battle that this trophy began to lose its importance. The Indians considered it a much braver act to touch the body of a fallen foe with a coup stick under fire of the enemy."

In the Handbook of Indian Tribes it is said "Coups are usually 'counted'—as it was termed—that is, credit of victory was taken for three brave deeds, *viz.*, killing an enemy, scalping an enemy or being the first to strike an enemy either alive or dead. Each one of these entitled a man to rank as a warrior and to recount the exploit in public; but to be first to touch the enemy was regarded as the greatest deed of all as it implied close approach during battle."

The first of these quotations is—except the last sentence—fantastically untrue, while the second is also misleading, since the killing or scalping of an enemy seems to be given equal rank with touching the enemy. Among the plains tribes with which I am well acquainted—and the same is true of all the others of which I know anything at all—coming in actual personal contact with the enemy by touching him with something held in the hand or with a part of the person was the bravest act that could be performed.

To kill an enemy was good in so far as it reduced the numbers of the hostile party. To scalp an enemy was not an important feat and in no sense especially creditable. Enemies were not infrequently left unscalped. If scalped, the skin of the head was taken merely as a trophy, something to show, something

¹From George Bird Grinnell, "Coup and Scalp Among the Plains Indians," *American Anthropologist*, new series, volume 12, pages 296-310, 1910.

to dance over—a good thing but of no great importance; but to touch the enemy with something held in the hand, with the bare hand, or with any part of the body, was a proof of bravery—a feat which entitled the man or boy who did it to the greatest credit.

When an enemy was killed, each of those nearest to him tried to be the first to reach him and touch him, usually by striking the body with something held in the hand, a gun, bow, whip, or stick. Those who followed raced up and struck the body—as many as might wish to do so. Anyone who wished to might scalp the dead. Neither the killing nor the scalping was regarded as an especially creditable act. The chief applause was won by the man who first could touch the fallen enemy. In Indian estimation the bravest act that could be performed was to count coup on—to touch or strike—a living unhurt man and to leave him alive, and this was frequently done. Cases are often told of where, when the lines of two opposing tribes faced each other in battle, some brave man rode out in front of his people, charged upon the enemy, ran through their line, struck one of them and then, turning and riding back, returned to his own party. If, however, the man was knocked off his horse, or his horse was killed, all of his party made a headlong charge to rescue and bring him off.

When hunting, it was not unusual for boys or young men, if they killed an animal, especially if it was an animal regarded as dangerous, to rush up and count coup on it. I have been told of cases where young men, who, chasing a black bear on the prairie, had killed it with their arrows, raced up to it on foot to see who should count the first coup.

It was regarded as an evidence of bravery for a man to go into battle carrying no weapon that would do any harm at a distance. It was more creditable to carry a lance than a bow and arrow; more creditable to carry a hatchet or war club than a lance; and the bravest thing of all was to go into a fight with nothing more than a whip, or a long twig—sometimes called a coup stick. I have never heard a stone-headed war club called coup stick.

It was not an infrequent practice among the Cheyenne—as indeed among other plains tribes—for a man, if he had been long sick and was without hope of recovery, or if some great misfortune had happened to him and he no longer wished to live, to declare his purpose to give his body to the enemy. In practice this meant committing suicide by attacking enemies without any suitable means of offense or defence, doing some very brave thing, and being killed while doing it. This, of course, was a most honorable way of dying, far more so than to kill one's self by shooting, by knife, or by the rope, though there was no disgrace in self-destruction. Suicide by hanging, however, was usually confined to girls who had been crossed in love.

There is still living in Montana a man who, when seventeen or eighteen years of age, after a long illness to which there seemed no end, declared to his father that he wished to give his body to the enemy. The father assented, fitted out the son with his strongest “medicine,” and sent the boy off with a

party to the south, armed only with a little hatchet. After the party had reached the country of the enemy, two of these, who were Omaha, were discovered returning from the hunt. Both had guns. The Cheyenne charged on them, and the boy, Sun's-road, having been provided with his father's best war horse, led. He overtook one of the enemy who turned and tried to shoot at him, but the gun snapped. Sun's-road knocked the man off his horse with his little hatchet and riding on overtook the other man, who turned and shot at him; but Sun's-road dropped down on his horse, avoided the bullet, and knocked the Omaha off his horse. Both enemies were killed by the Cheyenne who were following Sun's-road. The young man had now fulfilled his vow. He received from the members of the war party, and from the tribe when he returned to the village, the greatest praise. He recovered his health, and now at the age of seventy-four or seventy-five years still tells the story of his early adventures.

The Cheyenne counted coup on an enemy three times; that is to say, three men might touch the body and receive credit, according to the order in which this was done. Subsequent coups received no credit. The Arapaho touched four times. In battle the members of a tribe touched the enemy without reference to what had been done by those of another allied tribe in the same fight. Thus in a fight where Cheyenne and Arapaho were engaged the same man might be touched seven times. In a fight on the Rio Grande del Norte, where Cheyenne, Arapaho, Comanche, Kiowa, and Apache defeated the Ute, the counting the coups by the different tribes resulted in tremendous confusion.

When a Cheyenne touched an enemy the man who touched him cried "ah haih" and said "I am the first." The second to touch the body cried "I am the second," and so the third.

It is evident that in the confusion of a large fight, such as often took place, many mistakes might occur, and certain men might believe themselves entitled to honors which others thought were theirs. After the fight was over, then, the victorious party got together in a circle and built a fire of buffalo chips. On the ground near the fire were placed a pipe and gun. The different men interested approached this fire, and, first touching the pipe called out their deeds, saying, "I am the first," "second," or "third," as the case might be. Some man might dispute another and say, "No, I struck him first," and so the point would be argued and the difference settled at the time.

Often these disputes were hot. I recall one among the Pawnee about which there was great feeling. A Sioux had been killed and Baptiste Bahele, a half-breed Skidi and sub-chief, and a young man of no special importance, were racing for the fallen enemy to secure the honor of touching him first. Baptiste had the faster horse and reached the body first, but, just as he was leaning over to touch it, the animal shied and turned off, so that what he held in his hand did not actually touch the body, while the boy who was following him rode straight over the fallen man and struck him. Baptiste argued plausibly enough that he had reached the body first and was entitled to be

credited with the coup, but acknowledged that he did not actually touch the body, though he would have done so had his horse not shied. There was no difference of opinion among the Indians, who unanimously gave the honor to the boy.

Once two young Cheyenne were racing to touch a fallen enemy. Their horses were running side by side, though one was slightly ahead of the other. The man in advance was armed with a sabre, the other, almost even with him, was leaning forward to touch the enemy with his lance. A sabre being shorter than a lance, the leading man was likely to get only the second coup, but he reached down, grasped his comrade's lance, and gave it a little push, and it touched the enemy as they passed over him. Although the owner of the lance still held it, yet because his hand was behind the fellow's on its shaft, he received credit only for the second coup. If a man struck an enemy with a lance, anyone who touched or struck the lance while it was still fixed in or touching the enemy's person, received credit for the next coup.

A man who believed he had accomplished something made a strong fight for his rights and was certain to be supported in his contention by all his friends, and above all by all his relatives. When disputes took place, there were formal ways of getting at the truth. Among the Cheyenne a strong affirmation, or oath, was to rub the hand over the pipe as the statement was made, or to point to the medicine arrows and say, "Arrows, you hear me; I did (or did not do) this thing." The Blackfeet usually passed the hand over the pipe stem, thus asseverating that the story was as straight as the hole through the stem.

With the Cheyenne, if there was a dispute as to who had touched an enemy, counting the first coup, a still more formal oath might be exacted. A buffalo skull, painted with a black streak running from between the horns to the nose, red about the eye sockets, on the right-hand cheek a black, round spot, the sun, and on the left a red half-moon, had its eye sockets and its nose stuffed full of green grass. This represented the medicine lodge. Against this were rested a gun and four arrows, representing the medicine arrows. The men to be sworn were to place their hands on these and make their statements. Small sticks, about a foot long, to the number of the enemies that had been killed in the fight which they were to discuss were prepared and placed on the ground alongside the arrows and the gun.

In a mixed fight where many people were engaged there were always disputes, and this oath was often—even usually—exactd. A large crowd of people, both men and women, assembled to witness the ceremony. The chiefs directed the crier to call up the men who claimed honors, in the order in which they declared that they had struck an enemy; the man who claimed the first coup first, he who claimed the second coup second, and so on. The man making the oath walked up to the sacred objects and stood over them, and stretching up his hands to heaven said, *Mā i yūn asts'ni àh'tū*, "Spiritual powers, listen to me." Then bending down he placed his hands on the objects

and said, *Nā nit'shū*, "I touched him." After he had made his oath he added, "If I tell a lie, I hope that I may be shot far off."

He narrated in detail how he charged on the enemy and how he struck him. Then were called the men who counted the second and third coup on this same enemy and each told his story at length. Next the man who touched the second enemy was called, and he was followed by those who had counted the second and third coup on the same individual. In the same way all claimants told their stories.

If, under such circumstances, a man made a false statement, it was considered certain that before long he or some one of his family would die. The Cheyenne feared this oath, and, if a man was doubtful as to whether he had done what he claimed, he was very likely not to appear when his name was called. On the other hand, each of two men might honestly enough declare—owing to error—that he first touched an enemy. Or, a man might swear falsely. In the year 1862 a man disputing with another declared that he had first touched the enemy. The next year, while the Cheyenne were making the medicine lodge on the Republican river, this man died, and everyone believed, and said, that he had lied about the coup of the year before.

When two men were striving to touch an enemy and others were watching them, and the thing was close, the spectators might say to one of the two, "We did not see plainly what you did, but of what he did we are certain." In this way they might bar out from the first honor the man concerning whose achievement they were doubtful. As already said, the relatives of each claimant were active partisans of their kinsmen.

If enemies were running away and being pursued, and one fell behind or was separated from his party, and was touched three times, if he escaped serious injury and later got among his own people once more, the coup might again be counted on him up to the usual three times.

As an example of the odd things that have happened in connection with the practice of touching the enemy, according to Cheyenne rules, the curious case of Yellow-shirt may be mentioned. In the great battle that took place on Wolf Creek in 1838 between the allied Kiowa, Comanche, and Apache on one hand, and the Cheyenne and Arapaho on the other, coup was counted on Yellow-shirt,² a Kiowa, nine times. When the charge was made on the Kiowa camp, Yellow-shirt was fighting on foot and was touched three times, but not seriously injured. Later, he reached his village, mounted a horse, came out to fight and was touched three times on horseback. Almost immediately afterward his horse was killed and his leg broken, and he sat on the ground, still fighting by shooting arrows, and was again touched three times and killed. So in all nine coups were counted on this man, all of which were allowed. In another case coup was counted nine times on a Pawnee, who was not killed and finally got away.

²So called by the Cheyenne from his war shirt. His Kiowa name was Sleeping-bear.

If, through some oversight, the third coup had not been formally counted on an enemy, the act of taking off his moccasins as plunder has been decided to be the third coup, because the man who removed them touched the dead man's person. Coup, of course, might be counted on man, woman, or child. Anyone who was captured would first be touched.

There were other achievements which were regarded as sufficiently noteworthy to be related as a portion of a triumph, but which were in no sense comparable with the honor of touching an enemy. Such brave deeds, among the Blackfeet, were the taking of a captive, of a shield, a gun, arrows, a bow, or a medicine pipe, any of which acts might be coupled with touching an enemy.

Among the same people it was highly creditable to ride over an enemy on foot, and in the old-time dances of the different bands of the All-comrades, horses were frequently painted with the prints of a red hand on either side of the neck and certain paintings on the breast intended to represent the contact of the horse's body with the enemy.

Among the Cheyenne the capture of a horse or horses was such a brave deed, and, if the man who had touched an enemy took from him a shield or a gun, the capture of this implement was always mentioned. The drum would be sounded for touching the enemy, sounded again for the capture of the shield, again for the capture of the gun, and—if the man had scalped the dead—for the taking of the scalp.

I believe that the high esteem in which the act of touching the enemy is held is a survival of the old feeling that prevailed before the Indians had missiles and when—if they fought—they were obliged to do so hand to hand with clubs and sharpened sticks. Under such conditions only those who actually came to grips, so to speak, with the enemy—who met him hand to hand—could inflict any injury and gain any glory. After arrows came into use it may still have been thought a finer thing to meet the enemy hand to hand than to kill him with an arrow at a distance.

The general opinion that the act of scalping reflects credit on the warrior has no foundation. The belief perhaps arose from the fact that, when an enemy was killed or wounded, brave Indians rushed toward him. White observers have very likely inferred that those who were rushing upon an enemy were eager to take his scalp. As a matter of fact they cared little or nothing for the scalp but very much for the credit of touching the fallen man. Most people are untrustworthy observers and draw inferences from their preconceived notions, rather than from what actually takes place.

As already said, among the plains tribes a scalp was a mere trophy and was not highly valued. It was regarded as an emblem of victory and was a good thing to carry back to the village to rejoice and dance over. But any part of an enemy's body might serve for this, and it was not at all uncommon among the Blackfeet to take off a leg or an arm, or even a foot or hand, to carry back and rejoice over for weeks and months. Very commonly, a party returning from war would give one or more scalps to a group of old men and

old women, who would paint their faces black and carry the scalp about all through the village dancing at intervals, singing the praise of the successful warriors, making speeches in their honor, and generally rejoicing. Scalps were sometimes sacrificed among all these tribes, perhaps burned, as by the Pawnee, or among Cheyenne and Blackfeet tied to a pole and left out on the prairie to be rained on and finally to disappear in the weather. Scalps were used to trim and fringe war clothing—shirts and leggings—and to tie to the horse's bridle in going to war. Usually the scalps taken were small, a little larger than a silver dollar, but like any other piece of fresh skin they stretched greatly.

42. THE DECORATIVE ART OF THE INDIANS OF THE NORTH PACIFIC COAST¹

By FRANZ BOAS

It has been shown that the motives of the decorative art of many peoples developed largely from representations of animals. In course of time, forms that were originally realistic became more and more sketchy, and more and more distorted. Details, even large proportions, of the subject so represented were omitted, until finally the design attained a purely geometric character.

The decorative art of the Indians of the North Pacific Coast agrees with this oft-observed phenomenon in that its subjects are almost exclusively animals. It differs from other arts in that the process of conventionalizing has not led to the development of geometric designs, but that the parts of the animal body may still be recognized as such. The body of the animal, however, undergoes very fundamental changes in the arrangement and size of its parts. In the following paper I shall describe the characteristics of these changes, and discuss the mental attitude of the artist which led to their development.

In treating this subject, we must bear in mind that almost all the plastic art of the Indians of the North Pacific Coast is decorative art. While some primitive people—for instance, the Eskimo—produce carvings which serve no practical ends, but are purely works of art, all the works of the Indian artists of the region which we are considering serve at the same time a useful end; that is to say, the form of the object is given, and the subject to be represented is more or less subordinate to the object on which it is shown. Only in the cases of single totemic figures is the artist free to mould his subject without regard to such considerations; but, owing to the large size of such figures, he is limited by the cylindrical form of the trunk of the tree from which he carves his figures. We may therefore say that the native artist is in almost all his works limited by the shape of the object on which he represents his subject.

The plastic arts of the Indians are carving and painting, in which latter we may include tattooing and weaving. Carving is done mostly in wood, but also in stone and horn. It is either in the round, bas-relief, or, although more rarely, in high relief. There is no art of pottery.

¹Selected from Franz Boas, "The Decorative Art of the Indians of the North Pacific Coast," *Bulletin of the American Museum of Natural History*, volume 9, pages 123-176.



Fig. 1



Fig. 2



Fig. 3



Fig. 4

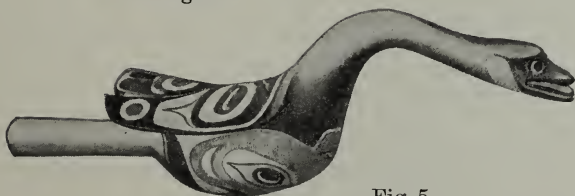


Fig. 5

Fig. 1. Helmet with carving representing a paralytic man. Tribe, Tlingit. Height, 21.5 cm.; width, 28 cm.; depth, 28 cm.

Fig. 2. Mask representing a dying warrior. Tribe, Tlingit. Height, 24 cm.; width, 19 cm.; depth, 11 cm.

Fig. 3. Dancing-hat representing a seal. Tribe, Tlingit. Height, 21 cm.; width, 24 cm.; depth, 23 cm.

Fig. 4. Small float representing a swimming puffin. Tribe, Tlingit. Length, 6 cm.

Fig. 5. Rattle representing a goose. Tribe, Haida. Length, 30 cm.

The artists have acquired a high technique, which proves that realistic representations of animals are not beyond their powers. The following are a few exquisite examples of realistic carvings. The helmet (fig. 1) is decorated with the head of an old man affected with partial paralysis. Undoubtedly this specimen must be considered a portrait head. Nose, eyes, mouth, and the general expression, are highly characteristic. The mask (fig. 2) represents a dying warrior. The artist has represented faithfully the wide lower jaw, the pentagonal face, and the strong nose of the Indian. The relaxing muscles of the mouth and tongue, the drooping eyelids, the motionless eyeballs, mark the agonies of death. The conception is so realistic that the mask creates a ghastly impression. Figure 3 represents a dancing hat decorated with the design of a seal. Figure 4 is a small float representing a swimming puffin. Figure 5 is a rattle in the form of a swimming goose. The characteristic bend of its neck and the characteristic color of head and neck are very true to nature.

In these cases the artist has rendered the form of his model faithfully. The object on which the representation of his model was placed allowed him the use of the figure without any alteration. This is not often the case. Generally the object to be decorated has a certain given form to which the decoration must be subordinated, and the artist is confronted with the problem of how to adjust his subject to the form of the object to be decorated.

Before attempting an explanation of the method adopted by the artist in the solution of this problem, we must treat another aspect of our subject. We must premise that in consequence of the adaptation of the form to the decorative field, the native artist cannot attempt a realistic representation of his subject, but is often compelled to indicate only its main characteristics. In consequence of the distortion of the animal body, due to its adaptation to various surfaces, it would be all but impossible to recognize what animal is meant, if the artist did not emphasize what he considers the characteristic features of animals. These are so essential to his mind that he considers no representation adequate in which they are missing. In many cases they become the symbols of the animal. We find, therefore, that each animal is characterized by certain symbols, and great latitude is allowed in the treatment of all features other than symbols.

I will illustrate this feature of the art of the Indians of the North Pacific Coast by means of a number of characteristic examples.

Figure 6 is a figure from a totem pole, which represents the beaver. It will be noticed that the face is treated somewhat like a human face, particularly the region around eyes and nose. The position of the ears, however, indicates that the artist intended to represent an animal head, not a human head. While the human ear is represented, in its characteristic form, on a level with the eye, animal ears are indicated over the forehead; that is to say, approximately in the position in which they appear in a front view of the animal. Their characteristic shape may be seen in figures 6 and 7, and in many others.

While the ears characterize the head as that of an animal, the two large incisors serve to identify the rodent *par excellence*—the beaver. The tail of the animal is turned up in front of its body. It is ornamented by cross-hatching, which is intended to represent the scales on the beaver's tail. In its fore paws it holds a stick. The large incisors, the tail with cross-hatching, and the stick, are symbols of the beaver, and each of these is a sufficient characteristic of the animal.



Fig. 6



Fig. 7



Fig. 8

Fig. 6. Lowest figure from model of a totem pole, carved in slate, representing a beaver. Tribe, Haida. Height 22.5 cm.

Fig. 7. Lowest figure from model of a totem pole, carved in slate, representing a beaver. Tribe, Haida. Height, 19 cm.

Fig. 8. Handle of a spoon made of mountain-goat horn, design representing a beaver. Tribe, Tlingit. Length of handle, 8 cm.

Figure 7 is another representation of a beaver from a totem pole. It resembles figure 6 in all details, except that the stick is missing. The beaver is simply holding its fore paws raised nearly to its chin. There are other carvings in which the beaver is shown with four or five toes, but the symbols described here never vary.

In figure 8, which is the handle of a spoon, we find only the first of the symbols of the beaver represented, namely, its incisors. Only the head and the fore paws of the animal are shown; and in its mouth are indicated an upper and a lower pair of incisors, all the other teeth being omitted. There is nothing except the teeth to indicate that the artist intended to represent the beaver.



Fig. 9. Headdress representing a beaver. The dragon-fly is shown on the chest of the beaver. Tribe, Haida. Height, 18 cm.

Figure 9 is the front of a dancing head-dress, which is attached to a framework made of whalebone, and set on top with bristles of the sea-lion. To the back is attached a long train of ermine skins. The outer side of the carved front is set with abalone shells. The squatting figure which occupies the centre of the front represents the beaver. The same symbols which were mentioned before will be recognized here. The face is human; but the ears, which rise over the eyebrows, indicate that an animal is meant. Two large pairs of incisors occupy the centre of the open mouth. The tail is turned up in front of the body, and appears between the two hind legs, indicated by cross-hatching. The fore paws are raised to the height of the mouth, but they do not hold a stick. It will be noticed that on the chest of the beaver another head is represented, over which a number of small rings stretch towards the chin of the beaver. Two feet, which belong to this animal, extend from the corners of its mouth towards the haunches of the beaver. This animal repre-

sents the dragon-fly, which is symbolized by a large head and a slender segmented body. In many representations of the dragon-fly there are two pairs of wings attached to the head. The face of this animal resembles also a human face; but the two ears, which rise over the eyebrows, indicate that an animal is meant. Combinations of two animals of this sort are found very frequently, a smaller figure of one animal being represented on the chest of a large carving. . . .

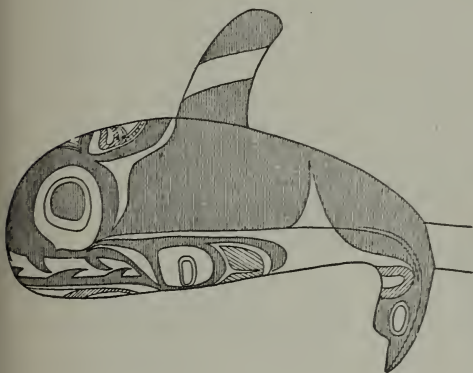


Fig. 18

Fig. 18. Rattle representing a killer-whale. Tribe, Haida or Tsimshian. Length, 25 cm.

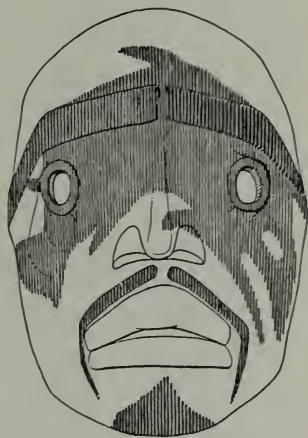


Fig. 19

Fig. 19. Mask with painting representing a killer-whale. Tribe, Bella Coola. Height, 28 cm.; width, 20 cm.; depth, 15 cm.

Figures 18 and 19 are representations of the killer-whale. In the rattle (fig. 18) the form of the whale will be easily recognized. Its tail is bent downward. The large head, one of the characteristic features of the whale, is much more pronounced in this than in the next figure. The eye appears on the front part of the rattle. Under the eye we see the large mouth, which is set with a number of curved spines. They are intended to represent the teeth. Immediately behind the mouth, on the lower part of the carving, we find the flippers. The painted ornament, which has the form of a small face, in front of the huge dorsal fin, is intended to represent the blow-hole. . . .

The following series (figures 21, 23) are representations of the shark. Whenever the whole body of this animal is represented, it is characterized by a heterocerc tail, a large mouth, the corners of which are drawn downward.

a series of curved lines on each cheek which represent the gills, and a high tapering forehead, which is often decorated with two circles and a series of curved lines similar to those found on the cheeks. . . .

Figure 21 is the handle of a copper dagger on which the mouth with depressed corners, the curved lines on the cheeks, and the ornament rising over the forehead, characterize the shark

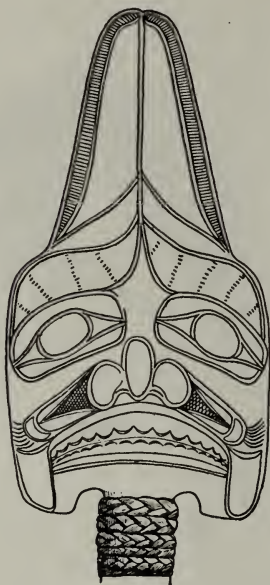


Fig. 21

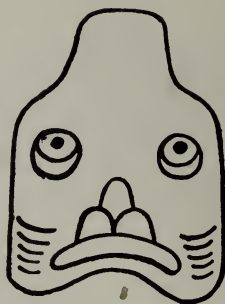


Fig. 23

Fig. 21. Handle of a dagger, representing the head of a shark. Tribe, Tlingit. Length of shark figure, 13.5 cm.; width, 6.5 cm.

Fig. 23. Tattooing representing a shark. Tribe, Haida. (Drawn from a photograph.)

Figure 23 is a copy of a tattooing on the back of a Haida woman. Here we have only the outline of the head of a shark, again characterized by a peculiarly high forehead, the depressed corners of the mouth, and curved lines on each cheek. . . .

Let us briefly recapitulate what we have thus far tried to show. Animals are characterized by their symbols, and the following series of symbols have been described in the preceding remarks:

1. Of the *beaver*: large incisors, scaly tail, and a stick held in the fore paws.
2. Of the *sculpin*: two spines rising over the mouth, and a continuous dorsal fin.

3. Of the *hawk*: large curved beak, the point of which is turned backward so that it touches the face.

4. Of the *eagle*: large curved beak, the point of which is turned downward.

5. Of the *killer-whale*: large head, large mouth set with teeth, blow-hole, and large dorsal fin.

6. Of the *shark*: an elongated rounded cone rising over the forehead, mouth with depressed corners, a series of curved lines on the cheeks, two circles and curved lines on the ornament rising over the forehead, round eyes, numerous sharp teeth, and heterocerc tail.

7. Of the *bear*: large paws, and large mouth set with teeth, with protruding tongue.

8. Of the *sea-monster*: bear's head, bear's paws with flippers attached, and gills and body of the killer-whale, with several dorsal fins.

9. Of the *dragon-fly*: large head, segmented, slender body, and wings.

So far I have considered the symbols only in connection with their use in representing various animals. It now becomes necessary to inquire in what manner they are used to identify the animals. We have seen that in a number of the preceding cases entire animals were represented, and that they were identified by means of these symbols. When we investigate this subject more closely, we find that the artist is allowed wide latitude in the selection of the form of the animal. Whatever the form may be, as long as the recognized symbols are present, the identity of the animal is established. We have mentioned before that the symbols are often applied to human faces, while the body of the figure has the characteristics of the animal.

We find this principle applied in figure 25, which represents a totem pole. Three animals are shown in this carving. Each of these has a human face, to which are added the symbols that characterize the animal. In the top figure the ears indicate that the head represents that of an animal; while the arms, to which the flippers are attached, indicate that the sea-monster is meant. The next figure below represents the shark. It is a human face, and it seems that originally a large lip with a labret was attached to it, which, however, was lost before the specimen came into pos-



Fig. 25.—Model of a totem-pole with three figures, representing, from below upward, a sculpin, a dog-fish, and a sea-monster. Tribe, Haida. Height, 47.5 cm.

session of the Museum. This would indicate that a female shark is represented. Its symbols in this case are the peculiar high ornament which rises over its forehead, and the fins, which are placed under the chin. The face of the lowest figure resembles the faces of the two upper figures very closely. Its body, which is shown under the face, makes it clear that the artist intended to represent a fish; and the two large spines which rise over the eyebrows specify that the figure represents a sculpin. . . .

These symbols are also used as facial paintings by dancers, who are thus recognized as personifying the animal in question, or as belonging to the social group presided over by the animal. At social or religious festivals ceremonies are performed which are in most cases dramatizations of myths, in which the dancer represents either the animal, or the spirit that appeared to his ancestor. In many of the composite masks used on such occasions, the ancestor himself is represented by a small figure placed on the mask, thus indicating that he was carried away by the animal which the dancer personifies. In other festivals, legends are dramatized which refer to the events that took place "before the animals took off their blankets;" that is, at the time when there was no clear distinction between men and animals. In these ceremonies the dancers appear with paintings or other decoration symbolizing the animals. To this class belongs the ornament (figure 30), which represents the dorsal fin of a killer-whale, and which is worn attached to the back part of the blanket. These ornaments and paintings are found most extensively among the Kwakiutl tribes.

It appears, therefore, that as, first of all, the artist tried to characterize the animals he intended to represent by emphasizing their most prominent characteristics, these gradually became symbols which were recognized even when not attached to the animal form, and which took the place of representations of the entire animal.

Having thus become acquainted with a few of the symbols of animals, we will next investigate in what manner the native artist adapted the animal form to the object he intended to decorate. First of all, we will direct our attention to a series of specimens which show that the native artist endeavors, whenever possible, to represent the whole animal on the object that he desires to decorate.

Figure 31 is a club used for killing seals and halibut before they are landed in the canoe. The carving represents the killer whale. If the principal symbol of the killer-whale, its dorsal fin, were placed in an upright position on the club, the implement would assume an exceedingly awkward shape. On the other hand, the artist could not omit the dorsal fin, since it is the most important symbol of the animal. Therefore he has bent it downward along the side of the body, so that it covers the flipper. The tail of the whale would have interfered with the handle, and for this reason it has been turned forward over the back of the whale, so as to be in close contact with the body.

The distortion of the body has been carried still further in figure 32, which is the handle of a spoon, and represents the same animal. The large head of the whale, to which the flippers are attached, will be easily recognized near the bowl of the spoon. The body has been twisted backward so that the tail almost touches the mouth. The carving is only on the back of the spoon, and

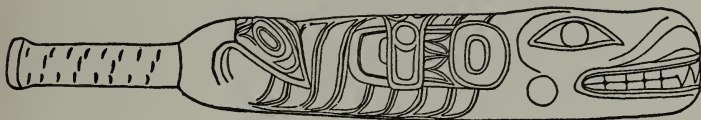


Fig. 31



Fig. 30



Fig. 32

Fig. 30. Wood-carving representing the dorsal fin of a killer-whale. Tribe, Tlingit. Height, 25 cm.; thickness, 3 cm.

Fig. 31. Fish-club carved to represent the killer-whale. Tribe, Tlingit. Total length, 49 cm.; height, 8 cm.; thickness, 5 cm.

Fig. 32. Handle of horn spoon with design representing a killer-whale. Tribe, probably Tsimshian. Length of handle, 15 cm.

the two projections just below the mouth will be recognized as the two tips of the whale's tail, which has been split along its lower side and then distended along the back of the spoon. The dorsal fin has thus been brought into a

position so as to extend along the handle of the spoon. It is seen projecting upward from the head of the whale, between the legs of the man who forms the tip of the handle. . . .

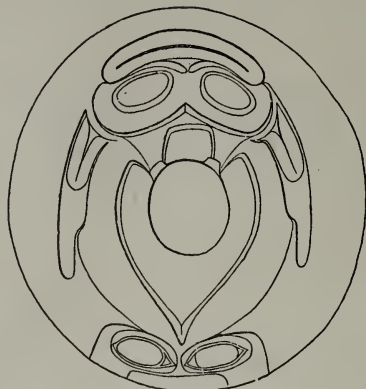


Fig. 39

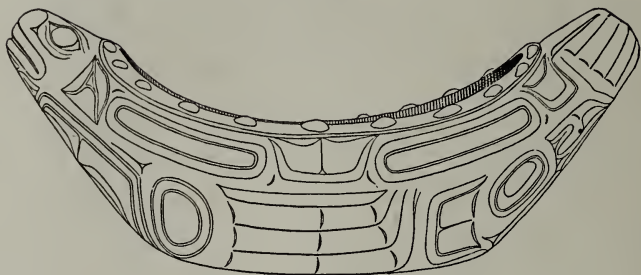


Fig. 40

Fig. 39. Dancing-hat with design representing a sculpin. Tribe, Haida or Tsimshian. Height, 14 cm.; width, 36 cm.; depth, 40 cm.

Fig. 40. Grease-dish in the shape of a seal. Tribe, Tlingit. Length, 41.5 cm.; width, 21 cm.; depth in center, 9.5 cm.

We have now to treat a series of peculiar phenomena which result from the endeavor on the part of the artist to adjust the animal that he desires to represent to the decorative field in such a manner as to preserve as far as possible the whole animal, and bring out its symbols most clearly.

Figure 39 is the top view of a wooden hat on which is carved the figure of a sculpin. The animal is shown in top view, as though it were lying with its lower side on the hat. The dancing hats of these Indians have the forms of

truncated cones. To the top are attached a series of rings, mostly made of basketry, which indicate the social rank of the owner, each ring symbolizing a step in the social ladder. The top of the hat, therefore, does not belong to the decorative field, which is confined to the surface of the cone. The artist found it necessary, therefore, to open the back of the sculpin far enough to make room for the gap in the decorative field. He has done so by representing the animal as seen from the top, but split and distended in the middle, so that the top of the hat is located in the opening thus secured.

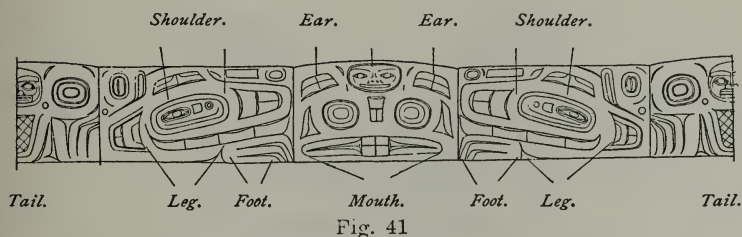


Fig. 41



Fig. 42

Fig. 41. Carving on the sides of a dish, representing a beaver. The sides of the dish are bent of a single piece of wood, and are shown here flattened out. Tribe, Tlingit. Length of short sides, 29 cm.; length of long sides, 31.5 cm.; greatest height of sides, 16 cm.

Fig. 42. Design on a bracelet representing a bear. Tribe, Nass River Indians. Height, 3.5 cm.

Figure 40 represents a dish in the shape of a seal. The whole dish is carved in the form of the animal; but the bottom, which corresponds to the belly, is flattened, and the back is hollowed out so as to form the bowl of the dish. In order to gain a wider rim the whole back has been distended so that the animal becomes inordinately wide as compared to its length. The flippers are carved in their proper positions at the sides of the dish. The hind flippers are turned back, and closely join the tail. A similar method of representation is used in decorating small boxes. The whole box is considered as representing an animal. The front of its body is painted or carved on the box front; its sides, on the sides of the box; the hind side of its body, on the back of the box. The bottom of the box is the animal's stomach; the top, or the open upper side, its

back. These boxes, therefore, are decorated only on the sides, which are bent of a single piece of wood (fig. 41). When we unbend the sides we find the decoration extended on a long band, which we may consider as consisting of two symmetrical halves. The centre is occupied by the front view of the animal, the sides by a side view, and the ends by one-half of the hind view at each end of the board. An actual unbending of the sides of the box would not give a symmetrical form; but, since the ends are necessarily sewed at the corner, the hind view of the body will occupy one end.



Fig. 43. Painting representing a bear. Tribe, Haida.

In the decoration of silver bracelets a similar principle is followed, but the problem differs somewhat from that offered in the decoration of square boxes. While in the latter case the four edges make a natural division between the four views of the animal—front and right profile, back and left profile—there is no such sharp line of division in the round bracelet, and there would be great difficulty in joining the four aspects artistically, while two profiles offer no such difficulty. When the tail end of each profile is placed where the ends of the bracelet join, then there is only one point of junction; namely, in the median line of the head. This is the method of representation that the native artists have adopted (fig. 42). The animal is cut in two from head to tail, so that the two halves cohere only at the tip of the nose and at the tip of the tail. The hand is put through this hole, and the animal now surrounds the wrist. In this position it is represented on the bracelet. The method adopted is therefore identical with the one applied in the hat (fig. 39), except that the central opening is much larger, and that the animal has been represented on a cylindrical surface, not a conical one.

An examination of the head of the bear shown on the bracelet (fig. 42), makes it clear that this idea has been carried out rigidly. It will be noticed that there is a deep depression between the eyes, extending down to the nose. This shows that the head itself must not be considered a front view, but as consisting of two profiles which adjoin at mouth and nose, while they are not in contact with each other on a level with the eyes and forehead. The peculiar ornament rising over the nose of the bear decorated with three rings, represents a hat with three rings, which designate the rank of the bearer. . . .



Fig. 44

Fig. 44. Painting from a house-front, representing a bear. Tribe, Tsimshian.



Fig. 45

Fig. 45. Wooden hat painted with the design of a sculpin. Tribe, Haida. Height, 17 cm.; width, 41 cm.; depth, 42.5 cm.

The transition from the bracelet to the painting or carving of animals on a flat surface is not a difficult one. The same principle is adhered to; and either the animals are represented as split in two so that the profiles are joined in the middle, or a front view of the head is shown with two adjoining profiles of the body. In the cases considered heretofore the animal was cut through and through from the mouth to the tip of the tail. These points were allowed to cohere, and the animal was stretched over a ring, a cone, or the sides of a

prism. If we imagine the bracelet opened, and flattened in the manner in which it is shown in figure 42, we have a section of the animal from mouth to tail, cohering only at the mouth, and the two halves spread over a flat sur-



Fig. 46. Hat made of spruce root, painted with the design of a beaver. Tribe, Haida or Tsimshian. Height, 16 cm.; diameter, 36.5 cm.



Fig. 53. Painting representing a shark. Tribe, Haida.

face. This is the natural development of the method here described when applied to the decoration of flat surfaces.

It is clear that on flat surfaces this method allows of modifications by changing the method of cutting. When the body of a long animal, such as that of a fish or of a standing quadruped, is cut in this manner, a design results which

forms a long narrow strip. This mode of cutting is therefore mostly applied in the decoration of long bands. When the field that is to be decorated is more nearly square, this form is not favorable. In such cases a square design is obtained by cutting quadrupeds sitting on their haunches in the same manner as before, and unfolding the animal so that the two halves remain in contact at the nose and mouth, while the median line at the back is to the extreme right and to the extreme left.



Fig. 62. Slate dish with design representing a killer-whale. Tribe, Haida. Diameter, 41.5 cm.; depth, 6.5 cm.

Figure 43 (a Haida painting) shows a design which has been obtained in this manner. It represents a bear. The enormous breadth of mouth observed in these cases is brought about by the junction of the two profiles of which the head consists.

This cutting of the head is brought out most clearly in the painting (fig. 44), which also represents the bear. It is the painting on the front of a Tsimshian house, the circular hole in the middle of the design being the door of the house. The animal is cut from back to front, so that only the front part of the head coheres. The two halves of the lower jaw do not touch each other. The back is represented by the black outline on which the hair is indicated by fine lines.

In a number of cases the designs painted on hats must also be explained as formed by the junction of two profiles. This is the case in the painted wooden

hat (fig. 45), on which the design of a sculpin is shown. It will be noticed that only the mouth of the animal coheres, while the eyes are widely separated. The spines rise immediately over the mouth. The flippers are attached to the corners of the face, while the dorsal fin is split into halves, each half being joined to an eye.

The beaver (fig. 46) has been treated in the same manner. The head is split down to the mouth, over which rises the hat with four rings. The split has been carried back to the tail, which, however, is left intact, and turned up towards the centre of the hat. The importance of the symbols becomes very clear in this specimen. If the two large black teeth which are seen under the four rings, and the tail with the cross-hatchings, were omitted, the figure would represent the frog. . . .

In the following figures we find a new cut applied. Figure 53. . . . represents the shark. I explained, when discussing the symbols of the shark, that in the front view of the animal the symbols are shown to best advantage. For this reason side views of the face of the shark are avoided, and in representing the whole animal a cut is made from the back to the lower side, and the two sides are unfolded, leaving the head in front view.

The painting (fig. 53) has been made in this manner, the two halves of the body being entirely separated from each other, and folded to the right and to the left. The heterocerc tail is cut in halves, and is shown at each end turned downward. The pectoral fins are shown unduly enlarged, in order to fill the vacant space under the head. . . .

In figure 62, which represents the design on a circular slate dish, we see a good case of the adaptation of a profile to the decorative field. The design represents a killer-whale with two dorsal fins. The animal is bent around the rim of a dish so that the head touches the tail. The two dorsal fins are laid flat along the back, while the large flipper occupies the center of the dish. . . .

I have described a number of sections applied in representing various animals. Heretofore we have had cases only in which the sections were rather simple. In many cases in which the adaptation of the animal form to the decorative field is more difficult, the sections and distortions are much more numerous and far-reaching than those described before.

The cut that has been applied in the totem pole (fig. 66) is also much more intricate than the preceding ones. The upper figure represents a bird which is shown in the form of a human being, to the arms of which wings are attached. Under this figure we find a representation of the killer-whale. The hind part of its body is more easily recognized than the head. A small human figure is seen riding on the dorsal fin. The tail, which appears at the lower margin of the figure, is turned backward over the back of the animal. We must therefore imagine that the head has been turned downward behind the human figure riding on the dorsal fin. We must remember that the part of the animal which is turned downward will be placed in the back of the totem pole, which is not carved, and that consequently, accord-

ing to what was stated before, the artist will split it and distend it so that the middle line will appear at each edge of the carved portion of the pole. Thus the right half of the head will be brought into view on the right side of the totem pole, the left half on the left. This is the explanation of the whale's head with its teeth, which is seen in our figure next to the tail, the lower jaw being omitted. The flipper, which adjoins the head, is laid over the back of the whale, immediately under the feet of the human being riding on the dorsal fin of the whale. The figure must therefore be explained in such a way that the animal is twisted twice, the tail being turned over the back, and the head being turned down under the stomach, the head being then split and extended outward. . . .

We can now sum up the results of our considerations. In the first part of this paper I described the symbols of a number of animals, and pointed out that in many cases there is a tendency to substitute the symbol for the whole animal. The works of art which I describe in the second part of my paper may be said to illustrate a principle which is apparently diametrically opposed to the former. While the symbolism developed a tendency to suppress parts of the animal, we find in the efforts of the artist to adapt the form of the animal to the decorative field a far-reaching desire to preserve, so far as feasible, the whole animal; and, with the exception of a few profiles, we do not find a single instance which can be interpreted as an endeavor to give a perspective and therefore realistic view of an animal. We have found a variety of methods applied which tend to bring the greatest possible part of the animal form into the decorative field. I conclude from this that it is the ideal of the native artist to show the whole animal, and that the idea of perspective representation is entirely foreign to his mind. His representations are combinations of symbols of the various parts of the body of the animal, arranged in such a way that if possible the whole animal is brought into view. The arrangement, however, is so that the natural relation of the parts is preserved, being changed only by means of sections and distortions, but so that the natural contiguity of the parts is preserved.



Fig. 66. Part of model of a totem pole, with design representing a killer-whale. Tribe, Haida. Height, from whale upward, 35 cm.; width, 8 cm.; depth, 6.5 cm.

The success of the artist depends upon his cleverness in designing lines of dissection and methods of distortion. When he finds it impossible to represent the whole animal, he confines himself to rearranging its most characteristic parts, always of course including its symbols. There is a tendency to exaggerate the size of the symbols at the expense of other parts of the subject. I presume this is the line in which the two principles of the decorative art of the Indians of the North Pacific Coast of America merge into each other. The gradual emphasizing of the symbol at the expense of other parts of the body leads in many cases to their entire suppression, and to designs in which the animal is indicated only by its symbols.

43. EGYPTIAN HIEROGLYPHIC WRITING¹

By E. A. WALLIS BUDGE

The ancient Egyptians expressed their ideas in writing by means of a large number of picture signs which are commonly called *Hieroglyphics*. They began to use them for this purpose more than seven thousand years ago, and they were employed uninterruptedly until about B. C. 100, that is to say, until nearly the end of the rule of the Ptolemies over Egypt. It is hardly probable that the hieroglyphic system of writing was invented in Egypt, and the evidence on this point now accumulating indicates that it was brought there by certain invaders who came from north-east or central Asia; they settled down in the valley of the Nile at some place between Memphis on the north and Thebes on the south, and gradually established their civilization and religion in their new home. Little by little the writing spread to the north and to the south, until at length hieroglyphics were employed, for state purposes at least, from the coast of the Mediterranean to the most southern portion of the Island of Meroë, that is to say, over a tract of country more than 2000 miles long. A remarkable peculiarity of Egyptian hieroglyphics is the slight modification of form which they suffered during a period of thousands of years, a fact due, no doubt, partly to the material upon which the Egyptians inscribed them, and partly to a conservatism begotten of religious convictions. The Babylonian and Chinese picture characters became modified at so early a period that some thousands of years before Christ, their original forms were lost. This reference to the modified forms of hieroglyphics brings us at once to the mention of the various ways in which they were written in Egypt, *i. e.*, to the three different kinds of Egyptian writing.

The oldest form of writing is the *hieroglyphic*, in which the various objects, animate and inanimate, for which the characters stand are depicted as accurately as possible. . . .

Hieroglyphics were cut in stone, wood, and other materials with marvellous accuracy, at depths varying from 1-16 of an inch to 1 inch; the details of the objects represented were given either by cutting or by painting in colours. In the earliest times the mason must have found it easier to cut characters into the stone than to sculpture them in relief; but it is probable that the idea of preserving carefully what had been inscribed also entered his mind, for fre-

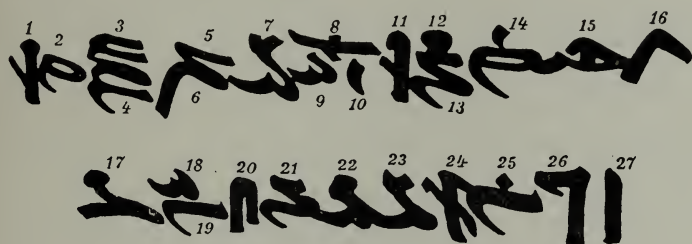
¹From pages 1-39 of E. A. Wallis Budge, *Easy Lessons in Egyptian Hieroglyphics*, Kegan Paul, Trench, Trübner and Co., Ltd., London, 1899. By permission.

quently when the surface outline of a character has been destroyed sufficient traces remain in the incuse portion of it for purposes of identification. Speaking generally, celestial objects are coloured blue, as also are metal vessels and instruments; animals, birds, and reptiles are painted as far as possible to represent their natural colours; the Egyptian man is painted red, and the woman yellow or a pinky-brown colour; and so on. . . .





















Picture signs or hieroglyphics were employed for religious and state purposes from the earliest to the latest times, and it is astonishing to contemplate the labour which must have been expended by the mason in cutting an inscription of any great length, if every character was well and truly made. Side by side with cutters in stone carvers in wood must have existed, and for a proof of the skill which the latter class of handicraftsmen possessed at a time which must be well nigh pre-dynastic, the reader is referred to the beautiful panels in the Gizeh Museum which have been published by Mariette. . . . But the Egyptians must have had need to employ their hieroglyphics for other purposes than inscriptions which were intended to remain in one place, and the official documents of state, not to mention the correspondence of the people, cannot have been written upon stone or wood. At a very early date the papyrus plant was made into a sort of paper upon which were written drafts of texts which the mason had to cut in stone, official documents, letters, etc. The stalk of this plant, which grew to the height of twelve or fifteen feet, was triangular, and was about six inches in diameter in its thickest part. The outer rind was removed from it, and the stalk was divided into layers with a flat needle; these layers were laid upon a board, side by side, and upon these another series of layers was laid in a horizontal direction, and a thin solution of gum was then run between them, after which both series of layers were pressed and dried. The number of such sheets joined together depended upon the length of the roll required. The papyrus rolls which have come down to us vary greatly in length and width; the finest Theban papyri are about seventeen inches wide, and the longest roll yet discovered is the great Papyrus of Rameses III, which measures one hundred and thirty-five feet in length. On such rolls of papyrus the Egyptians wrote with a reed, about ten inches long and one eighth of an inch in diameter, the end of which was bruised to make the fibres flexible, and not cut; the ink was made of vegetable substances, or of coloured earths mixed with gum and water.

Now it is evident that the hieroglyphics traced in outline upon papyrus with a comparatively blunt reed can never have had the clearness and sharp outlines of those cut with metal chisels in a hard substance; it is also evident that the increased speed at which government orders and letters would have to be written would cause the scribe, unconsciously at first, to abbreviate and modify the picture signs, until at length only the most salient characteristics of each remained. And this is exactly what happened. Little by little the hieroglyphics lost much of their pictorial character, and degenerated into a series of signs which went to form the cursive writing called *Hieratic*. It

was used extensively by the priests in copying literary works in all periods, and though it occupied originally a subordinate position in respect of hieroglyphics, especially as regards religious texts, it at length became equal in importance to hieroglyphic writing. The following example of hieratic writing is taken from the Prisse Papyrus upon which at a period about B. C. 2600 two texts, containing moral precepts which were composed about one thousand years earlier, were written.



Now if we transcribe these into hieroglyphics we obtain the following:

- | | |
|--|--|
| 1.  a reed | 11.  see No. 1 |
| 2.  a mouth | 12.  a knee bone (?) |
| 3.  a hare | 13.  see No. 2. |
| 4.  the wavy surface
of water | 14.  a roll of papyrus
tied up |
| 5.  see No. 4 | 15.  an eye |
| 6.  a kind of vessel | 16.  see No. 6 |
| 7.  an owl | 17.  a goose |
| 8.  a bolt of a door | 18.  see No. 9 |
| 9.  a seated figure
of a man | 19.  see No. 4 |
| 10. a stroke written
to make the word
symmetrical | 20.  a chair back |
| | 21.  a sickle |

On comparing the above hieroglyphics with their hieratic equivalents it will be seen that only long practice would enable the reader to identify quickly the abbreviated characters which he had before him; the above specimen of hieratic is, however, well written and is relatively easy to read. In the later times, *i. e.*, about B. C. 900, the scribes invented a series of purely arbitrary

or conventional modifications of the hieratic characters and so a new style of writing, called *Enchorial* or *Demotic*, came into use; it was used chiefly for business or social purposes at first, but at length copies of the "Book of the Dead" and lengthy literary compositions were written in it. In the Ptolemaic period Demotic was considered to be of such importance that whenever the text of a royal decree was inscribed upon a stele which was to be set up in some public place and was intended to be read by the public in general, a version of the said decree, written in the Demotic character, was added. . . .

Hieroglyphic characters may be written in columns or in horizontal lines, which are sometimes to be read from left to right and sometimes from right to left. There was no fixed rule about the direction in which the characters should be written, and as we find that in inscriptions which are cut on the sides of a door they usually face inwards, *i. e.*, towards the door, each group thus facing the other, the scribe and sculptor needed only to follow their own ideas in the arrangement and direction of the characters, or the dictates of symmetry. To ascertain the direction in which an inscription is to be read we must observe in which way the men, and birds, and animals face, and then read *towards* them. . . .

Hieratic is usually written in horizontal lines which are to be read from right to left, but in some papyri dating from the XIIth dynasty the texts are arranged in short columns.

Before we pass to the consideration of the Egyptian Alphabet, syllabic signs, etc., it will be necessary to set forth briefly the means by which the power to read these was recovered, and to sketch the history of the decipherment of Egyptian hieroglyphics in connection with the *Rosetta Stone*. . . .

The Rosetta Stone was found by a French artillery officer called Boussard, among the ruins of Fort Saint Julien, near the Rosetta mouth of the Nile, in 1799, but it subsequently came into the possession of the British Government at the capitulation of Alexandria. It now stands at the southern end of the great Egyptian Gallery in the British Museum. The top and right hand bottom corner of this remarkable object have been broken off, and at the present the texts inscribed upon it consist of fourteen lines of hieroglyphics, thirty-two lines of demotic, and fifty-four lines of Greek. It measures about 3 ft. 9 in. x 2 ft. 4½ in. x 11 in. on the inscribed side.

The Rosetta Stone records that Ptolemy V. Epiphanes, king of Egypt from B. C. 205 to B. C. 182, conferred great benefits upon the priesthood, and set aside large revenues for the maintenance of the temples, and remitted the taxes due from the people at a period of distress, and undertook and carried out certain costly engineering works in connection with the irrigation system of Egypt. In gratitude for these acts the priesthood convened a meeting at Memphis, and ordered that a statue of the king should be set up in every temple of Egypt, that a gilded wooden statue of the king placed in a gilded wooden shrine should be established in each temple, etc.; and as a part of the

great plan to do honour to the king it was ordered that a copy of the decree, inscribed on a basalt stele in hieroglyphic, demotic, and Greek characters, should be set up in each of the first, second, and third grade temples near the king's statue. The provisions of this decree were carried out in the eighth year of the king's reign, and the Rosetta Stone is one of the stelae which, presumably, were set up in the great temples throughout the length and breadth of the land. But the importance of the stone historically is very much less than its value philologically, for the decipherment of the Egyptian hieroglyphics is centred in it, and it formed the base of the work done by scholars in the past century which has resulted in the restoration of the ancient Egyptian language and literature.

It will be remembered that long before the close of the Roman rule in Egypt the hieroglyphic system of writing had fallen into disuse, and that its place had been taken by demotic, and by Coptic, that is to say, the Egyptian language written in Greek letters; the widespread use of Greek and Latin among the governing and upper classes of Egypt also caused the disappearance of Egyptian as the language of state. The study of hieroglyphics was prosecuted by the priests in remote districts probably until the end of the Vth century of our era, but very little later the ancient inscriptions had become absolutely a dead letter, and until the beginning of the present century there was neither an Oriental nor a European who could either read or understand a hieroglyphic inscription. Many writers pretended to have found the key to the hieroglyphics, and many more professed, with a shameless impudence which it is hard to understand in these days, to translate the contents of the texts into a modern tongue. Foremost among such pretenders must be mentioned Athanasius Kircher who, in the XVIIth century, declared that he had found the key to the hieroglyphic inscriptions; the translations which he prints in his *Oedipus Aegyptiacus* are utter nonsense, but as they were put forth in a learned tongue many people at the time believed they were correct. More than half a century later the Comte de Pahlın stated that an inscription at Denderah was only a translation of Psalm C., and some later writers believed that the Egyptian inscriptions contained Bible phrases and Hebrew compositions. In the first half of the XVIIIth century Warburton appears to have divined the existence of alphabetic characters in Egyptian, and had he possessed the necessary linguistic training it is quite possible that he would have done some useful work in decipherment. Among those who worked on the right lines must be mentioned de Guignes, who proved the existence of groups of characters having determinatives, and Zoëga, who came to the conclusion that the hieroglyphics were letters, and what was very important, that the cartouches, *i. e.*, the ovals which occur in the inscriptions and are so called because they resemble cartridges, contained royal names. In 1802 Akerblad, in a letter to Silvestre de Sacy, discussed the demotic inscription on the Rosetta Stone, and published an alphabet of the characters. But Akerblad never received the credit which was his due for this work, for although it will be found,


on comparing Young's "Supposed Enchorial Alphabet" printed in 1818 with that of Akerblad printed in 1802, that *fourteen* of the characters are identical in both alphabets, no credit is given to him by Young. Further, if Champollion's alphabet, published in his *Lettre à M. Dacier*, Paris, 1822, be compared with that of Akerblad, sixteen of the characters will be found to be identical; yet Champollion, like Young, seemed to be oblivious of the fact.

With the work of Young and Champollion we reach firm ground. A great deal has been written about the merits of Young as a decipherer of the Egyptian hieroglyphics, and he has been both over-praised and over-blamed. He was undoubtedly a very clever man and a great linguist, even though he lacked the special training in Coptic which his great rival Champollion possessed. In spite of this, however, he identified correctly the names of six gods, and those of Ptolemy and Berenice; he also made out the true meanings of several ideographs, the true values of six letters of the alphabet, and the correct consonantal values of three more. This he did some years before Champollion published his Egyptian alphabet, and as priority of publication (as the late Sir Henry Rawlinson found it necessary to say with reference to his own work on cuneiform decipherment) must be accepted as indicating priority of discovery, credit should be given to Young for at least this contribution towards the decipherment. No one who has taken the pains to read the literature on the subject will attempt to claim for Young that the value of his work was equal to that of Champollion, for the system of the latter scholar was eminently scientific, and his knowledge of Coptic was wonderful, considering the period when he lived. Besides this the quality of his hieroglyphic work was so good, and the amount of it which he did so great, that in those respects the two rivals ought not to be compared. He certainly knew of Young's results, and the admission by him that they existed would have satisfied Young's friends, and in no way diminished his own merit and glory.

In the year 1815 Mr. J. W. Banks discovered on the Island of Philae a red granite obelisk and pedestal which were afterwards removed at his expense by G. Belzoni and set up at Kingston Hall in Dorsetshire. The obelisk is inscribed with one column of hieroglyphics on each side, and the pedestal with twenty-four lines of Greek. In 1822 Champollion published an account of this monument in the *Revue encyclopédique* for March, and discussed the hieroglyphic and Greek inscriptions upon it. The Greek inscription had reference to a petition of the priests of Philae made to Ptolemy, and his wife Kleopatra, and his sister also called Kleopatra, and these names of course occur in it. Champollion argued that if the hieroglyphic inscription has the same meaning as the Greek, these names must also occur in it. Now the only name found on the Rosetta Stone is that of Ptolemy which is, of course, contained in a cartouche, and when Champollion examined the hieroglyphic inscription on the Philae obelisk, he not only found the royal names there, enclosed in cartouches, but also that one of them was identical with that which he knew from the Greek of the Rosetta Stone to be that of Ptolemy. He was certain that

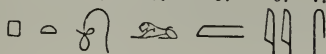
this name was that of Ptolemy, because in the Demotic inscription on the Rosetta Stone the group of characters which formed the name occurred over and over again, and in the places where, according to the Greek, they ought to occur. But on the Philæ Obelisk the name Kleopatra is mentioned, and in both of the names of Ptolemy and Kleopatra the same letters occur, that is to say L and P; if we can identify the letter P we shall not only have gained a letter, but be able to say at which end of the cartouches the names begin. Now writing down the names of Ptolemy and Kleopatra as they usually occur in hieroglyphics we have:

Ptolemy 


Kleopatra 

Let us however break the names up a little more and arrange the letters under numbers thus:—

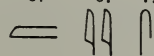

Ptolemy.

1. 2. 3. 4. 5. 6. 7.


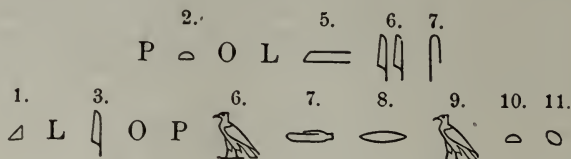
Kleopatra.

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11.


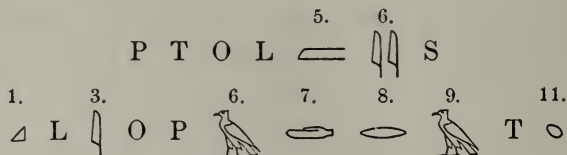
We must remember too that the Greek form of the name Ptolemy is Ptolemaios. Now on looking at the two names thus written we see at a glance that letter no. 5 in one name and no. 1 in the other are identical, and judging by their position only in the names they must represent the letter P; we see too that letter no. 2 in one name and no. 4 in the other are also identical, and arguing as before from their position they must represent the letter L. * We may now write down the names thus:—

2. 3. 4. 5. 6. 7.
 P L P 
 1. 3. 4. 6. 7. 8. 9. 10. 11.


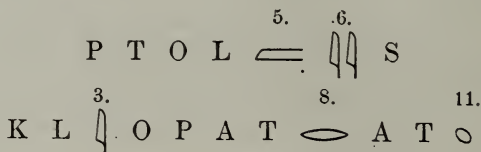
As only one of the names begin with P, that which begins with that letter must be Ptolemy. Now letter no. 4 in one name, and letter no. 3 in the other are identical, and also judging by their position we may assign it in each name the value of some vowel sound like O, and thus get:—



But the letter between P and O in Ptolemy must be T, and as the name ends in Greek with S, the last letter in hieroglyphics must be S, so we may now write down the names thus:—



Now if we look, as Champollion did, at the other ways in which the name of Kleopatra is written we shall find that instead of the letter no. 7 we sometimes have the letter no. 2 which we already know to be T, and as in the Greek form of the name this letter has an A before it, we may assume that no. 6=A; the initial letter must, of course, be K. We may now write the names thus:—



The sign no. 3 in the name Kleopatra represents some vowel sound like E, and this sign doubled (no. 6) represents the vowels AI in the name Ptolemaios; but as no. 6 represents EE, or Î, that is to say I pronounced in the Continental fashion, the O of the Greek form has no equivalent in hieroglyphics. That leaves us only the signs no. 5 in Ptolemaios and 8 and 11 in Kleopatra to find values for. Young had proved that the double sign T and 11 always occurred

at the ends of the names of goddesses, and that it was a feminine termination; as the Greek kings and queens of Egypt were honoured as deities, this termination was added to the names of royal ladies also. This disposes of the sign no. 11, and the letters no. 5 and no. 8 can be nothing else but M and R. So we may now write:—




























P T O L M I S, *i. e.*, Ptolemy,
K L E O P A T R A, *i. e.*, Kleopatra. . . .

Every hieroglyphic character is a picture of some object in nature, animate, or inanimate, and in texts many of them are used in more than one way. The simplest use of hieroglyphics is, of course, as pictures. . . . But hieroglyphics may also represent *ideas*, *e. g.*, a wall falling down sideways represents the idea of “falling”; a hall in which deliberations by wise men were made represents the idea of “counsel”; an axe represents the idea of a divine person or a god; a musical instrument represents the idea of pleasure, happiness, joy, goodness, and the like. Such are called *ideographs*. Now every picture of every object must have had a name, or we may say that each picture was a word-sign; a list of all these arranged in proper order would have made a dictionary in the earliest times. But let us suppose that at the period when these pictures were used as pictures only in Egypt, or wherever they first appeared, the king wished to put on record that an embassy from some such and such a neighbouring potentate had visited him with such and such an object, and that the chief of the embassy, who was called by such and such a name, had brought him rich presents from his master. Now the scribes of the period could, no doubt, have reduced to writing an account of the visit, without any very great difficulty, but when they came to record the name of the distinguished visitor, or that of his master, they would not find this to be an easy matter. To have written down the name they would be obliged to make use of a number of hieroglyphics or picture characters which represented most closely the sound of the name of the envoy, without the least regard to their meaning as pictures, and, for the moment, the picture characters would have represented sounds only. The scribes must have done the same had they been ordered to make a list of the presents which the envoy had brought for their royal master. Passing over the evident anachronism let us call the envoy “Ptolemy,” which name we may write, as in the preceding chapter, with the signs:—



Now no. 1 represents a door, no. 2 a cake, no. 3 a knotted rope, no. 4 a lion, no. 5 (uncertain), no. 6 two reeds, and no. 7 a chairback; but here each of these characters is employed for the sake of its *sound* only.

The need for characters which could be employed to express *sounds only* caused the Egyptians at a very early date to set aside a considerable number of picture signs for this purpose, and to these the name of *phonetics* has been given. Phonetic signs may be either syllabic or alphabetic, *e. g.*, *peh*, *mut*, *maut*,

| | | | |
|--|------------------|---|--------------|
|  | A (𐎀) |  | S (𐎎) |
|  | Ā (𐎁) |  | S (𐎎) |
|  | Ā (𐎁) |  | SH (𐎎) (𐎎) |
|  or 𐎎 | I (𐎎) |  | K (𐎎) |
|  or 𐎎 | U (𐎎) |  | Q (𐎎) |
|  | B (𐎎) |  | K (𐎎) |
|  | P (𐎎) |  | T (𐎎) |
|  | F (𐎎) |  | T (𐎎) |
|  or  | M (𐎎) |  | TH (𐎎) (𐎎) |
|  or  | N (𐎎) |  | TCH (T') (𐎎) |
|  or  | R and L (𐎎, 𐎎) | | |
|  | H (𐎎) | | |
|  | H (𐎎) | | |
|  | KH (𐎎) (Arab. 𐎎) | | |

EGYPTIAN ALPHABET

xeper, which are syllabic, and *p*, *b*, *m*, *r*, *k*, which are alphabetic. Now the five alphabetic signs just quoted represent as pictures, a door, a foot and leg, an owl, a mouth, and a vessel respectively, and each of these objects no doubt had a name; but the question naturally arises how they came to represent single letters? It seems that the sound of the *first letter* in the name of an object was given to the picture or character represented it, and henceforward the character bore that phonetic value. Thus the first character P, represents a door made of a number of planks of wood upon which three cross-pieces are














nailed. There is no word in Egyptian for door, at all events in common use, which begins with P, but, as in Hebrew, the word for door must be connected with the root "to open"; now the Egyptian word for "to open" is *pt[a]h* and as we know that the first character in that word has the sound of P and of no other letter, we may reasonably assume that the Egyptian word for "door" began with P. The third character M represents the horned owl, the name of which is preserved for us in the Coptic word *mûlotch*; the first letter of this word begins with M, and therefore the phonetic value of the owl sign is M. In the same way the other letters of the Egyptian alphabet were derived, though it is not always possible to say what the word-value of a character was originally. In many cases it is not easy to find the word-values of an alphabetic sign, even by reference to Coptic, a fact which seems to indicate that the alphabetic characters were developed from word-values so long ago that the word-values themselves have passed out of the written language. Already in the earliest dynastic inscriptions known to us hieroglyphic characters are used as pictures, ideographs and phonetics side by side, which proves that these distinctions must have been invented in pre-dynastic times.

The Egyptian alphabet has a great deal in common with the Hebrew and other Semitic dialects in respect of the guttural and other letters, peculiar to Oriental peoples, and therefore the Hebrew letters have been added to shew what I believe to be the general values of the alphabetic signs. It is hardly necessary to say that differences of opinion exist among scholars as to the method in which hieroglyphic characters should be transcribed into Roman letters, but this is not to be wondered at considering that the scientific study of Egyptian is only about eighty years old, and that the whole of the literature has not yet been published.













Some ideographs have more than one phonetic value, in which case they are called *polyphones*; and many ideographs representing entirely different objects have similar values, in which case they are called homophones.

As long as the Egyptians used picture writing pure and simple their meaning was easily understood, but when they began to spell their words with alphabetic signs and syllabic values of picture signs, which had no reference whatever to the original meaning of the signs, it was at once found necessary to indicate in some way the meaning and even sounds of many of the words so written; this they did by adding to them signs which are called *determinatives*. It is impossible to say when the Egyptians first began to add determinatives to their words, but all known hieroglyphic inscriptions not pre-dynastic contain them, and it seems as if they must have been the product of pre-historic times. They, however, occur less frequently in the texts of the earlier than of the later dynasties.





Determinatives may be divided into two groups; those which determine a single species, and those which determine a whole class. The following determinatives of classes should be carefully noted:—

| Character | Determinative of | Character | Determinative of |
|--|--|---|----------------------------|
| 1.  | to call, beckon | 6.  or  | god, divine being or thing |
| 2.  | man | 7.  | goddess |
| 3.  | to eat, think, speak, and of whatever is done with the mouth | 8.  | tree |
| 4.  | inertness, idleness | 9.  | plant, flower |
| 5.  | woman | 10.  | earth, land |
| | | 11.  | road, to travel |
| | | 12.  | foreign land |

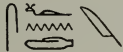
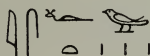
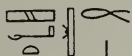
A few words have no determinative, and need none, because their meaning was fixed at a very early period, and it was thought unnecessary to add any; examples of such are *henā* "with," *ām* "in," *māk* "verily" and the like. On the other hand a large number of words have one determinative, and several have more than one. Of words of one determinative the following are examples:

1.   *ām* to eat; a picture of a man putting food into his mouth  is the determinative.
2.   *ānχ* a flower; the picture of a flower  is the determinative.
3.   *sma* to slay; the picture of a knife  is the determinative, and indicates that the word *sma* means "knife", or that it refers to some action that is done with a knife.
4.   *ses* bolt; the picture of the branch of a tree  is the determinative, and indicates that *ses* is an object made of wood.

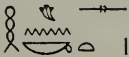

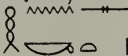
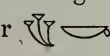





Of words of one or more determinatives the following is an example:—

1.  *renpit* flowers; the pictures of a flower in the bud , and a flower , are the determinatives; the three strokes  are the sign of the plural.

Words may be spelt (1) with alphabetic characters wholly, or (2) with a mixture of alphabetic and syllabic characters; examples of the first class are:—

- | | | |
|---|--------------|------------|
|  | <i>sfent</i> | a knife |
|  | <i>asfet</i> | wickedness |
|  | <i>sat</i> | a book |

And examples of the second class are:—

1.  *henkset* hair, in which  has by itself the value of *hen*; so the word might be written  or 
.
2.  *nehebet* neck, in which  has by itself the value of *neh*; so the word might be written  as well as .

We may now take a short extract from the Tale of the Two Brothers, which will illustrate the use of alphabetic and syllabic characters and determinatives; the determinatives are marked by *; and the syllabic characters by †; the remaining signs are alphabetic. (N. B. There is no *e* in Egyptian.)

| | | | | | | |
|----|----|------|---------|-------|-----|--|
| | | | | | | |
| un | an | paif | sen | āa | her | |
| | | His | brother | elder | | |

| | | | | | |
|-------------|----|----------|-----------|------|-----|
| | | | | | |
| xeperu | mā | ābu | qemātu | au-f | her |
| became like | | panthers | southern. | He | |








| | | | | |
|------|-------|------|---------|--|
| | | | | |
| ṭāt | ṭemtu | paif | nui | |
| made | sharp | his | dagger, | |

| | | | | | | |
|------|-----|-----------|----|-----------|----|----|
| | | | | | | |
| au-f | her | ṭātu-f | em | ṭet-f | un | an |
| he | | placed it | in | his hand. | | |








| | | | | | |
|------|---------|-------|-------|----|--|
| | | | | | |
| paif | sen | āa | āḥā | en | |
| His | brother | elder | stood | | |

| | | | | | |
|--------|-----|------|--------|--|--|
| | | | | | |
| ḥa | pa | sbai | paif | | |
| behind | the | door | of his | | |







| | | | | | |
|--------|----|-------|------|--|--|
| | | | | | |
| āḥait | er | ḫaṭbu | paif | | |
| stable | to | stab | his | | |

| | | | | | | |
|---|---|---|---|---|---|---|
|  |  |  |  |  |  |  |
| <i>sen</i> | <i>serâu</i> | <i>em</i> | <i>paif</i> | <i>i</i> | | <i>em</i> |

| | | | | | | |
|---------|---------|----|-----|--------|--|----|
| brother | younger | at | his | coming | | at |
|---------|---------|----|-----|--------|--|----|

| | | | | | | |
|---|---|---|---|---|---|---|
|  |  |  |  |  |  |  |
| <i>ruha</i> | | <i>er</i> | <i>ṭāt</i> | <i>āq</i> | | <i>naif</i> |

| | | | | | | |
|----------|----|------|----------|-----|--|--|
| eventide | to | make | to enter | his | | |
|----------|----|------|----------|-----|--|--|

| | | | | | | |
|---|---|---|---|---|---|---|
|  |  |  |  |  |  |  |
| <i>āaut</i> | | <i>er</i> | <i>pa</i> | | <i>āhait</i> | |

| | | | |
|--------|------|-----|----------|
| cattle | into | the | stables. |
|--------|------|-----|----------|

44. THE BOOK OF THE LIFE OF THE ANCIENT MEXICANS

[The following account and pictures are taken from an ancient manuscript or codex which bears on the original sheets the following caption: "Book of the life which was led by the Indians of former days, with an account of the superstitions and evil performances which they believed in and observed." The manuscript consists of seventy-six colored pictures, apparently the work of native Aztec draughtsmen, accompanied by explanatory notes in Spanish. The manuscript in this form was known as the Codex Magliabecchi and was preserved in Florence. A facsimile of it, in color, edited by Zelia Nuttall, but not translated, was published by the University of California Press in 1903, under the title "The Book of the Life of the Ancient Mexicans, part I." In the original manuscript no author is mentioned for the explanatory notes in Spanish, but these have been identified by Mrs. Nuttall with portions of a "Cronica de las Indias" or History of the Indies, that is America, written by Cervantes de Salazar.

Twelve of the illustrations in this work are here reproduced minus color. The Spanish text is given complete in translation or close paraphrase, except for the first sixteen pages of the manuscript which refer to blanket designs and the calendar. The numbers heading the sections of text refer to the paging of the pictures in the original. A few remarks as to pronunciation and order of the illustrations have been omitted from the translation; and occasional explanatory words or phrases supplied by the translator are enclosed in square brackets. The translation is the work of T. T. Waterman.]

17.

This festival the Indians call *Xilomaniztli*. The Mexicans [of Tenochtitlan] and certain others call it *Alcavalo* . . . , for the reason that at this time the fishermen "leave off;" that is to say, leave the water. They call the festival *Xilomaniztli* because they paint it [the image of the god] with ears of maize in its fist. These ears before the grain hardens are called *xiloll*, from which is derived *Xilomaniztli*, that is to say, "he holds *xilotes* in his hand." In this festival they sacrifice boys. The demon is called *Tlaloc* in Mexico. They drown these boys in canoes. . . .

18.

This figure represents the festival which the Indians call *Tlacaxipeualiztli* . . . , which means "he skins me and you shall eat me"; because in this festival they kill one whom they call *Totodeci* or *Xipeu*. . . . He is tied to a wheel of stone, which they *tamalacalli*. When tied to this, they give him a club in his hand, very bravely. Then another Indian, covered with the skin of a tiger [ocelot] goes against him, also holding in his hand a club. This second club is



18



26

set with pointed objects. Then they give it to each other until the one who is tied up is killed. Then he skins him, and later, dressed in the skin of the dead man, he dances before the demon, whom they call *Tlacateu Texcatepocatl*. He who has to fight fasts for four days, and exercises for many days previously to fighting with the tied-up person. He also offers many sacrifices to this demon, so that the demon may give him victory. . . .

The date is the twenty-first of March, the feast of St. Benedict. It is a great festival.

19.

This is an illustration of the festival of a [female] demon which the Indians call *Toçoztli*. The demon for whom they celebrate this festival is named *Chalchuite* because they put around its neck a necklace of emeralds [jade or turquoise], which they call *chalchuiltl*; and they call those whom they sacrificed in this festival *tlacateuuiltl*. These were children. They offer much copal [incense] and [maguey] paper and stalks of maize. Moreover in this festival they sacrificed an Indian woman, and this woman tied a fillet around her hair in simulation of the demon, who is represented in the fashion shown on the opposite page. It is worthy of note that in this festival small children were sacrificed, and female children, and also newly born infants. They also bestow names on them, as we Christians do in baptism. This point is mentioned in regard to one of the festivals which are taken up in later pages, but the ceremony is restricted to these two occasions. They also gave food to their elders. He who was once offered in this way they never offered again. They called this festival *Tlicoquepipiltontli*, and they gave the demon, whom they call *centeotl*, tamales and other things to eat. . . .

20.

This festival they call *Gacitocoztli* because they offer before the demon stalks with leaves (consisting entirely of maize) which among them is called *tucltli*. In this festival they offer to the demon a great deal of maize and tamales mixed with beans. In this festival boys at dawn place in their temples such loaves of maize. The demon to whom they celebrate this festival is called *Ocenteuiltl*, that is to say, deity of the maize. In this festival fathers offer to the demon children at the breast, as in the sacrifice. They invite their elders to feast. This is called *tecoa* which means in their language "sacrifice". . . .

21.

This is the festival which the Indians call *Toxcatl*. . . . It was a great festival, because the demon whose rites were celebrated in these ceremonies is *Texcatepocatl* that is, Smoking Mirror. He was the greatest of the greater gods whom they revered. They also give him as another name *Titlacauan*, that is to say, "of whom we are slaves." In his honor they perform

dances, and sing songs, and offer roses, and bring labrets and feathers, which are the things they value most. In this festival they cut their tongues and offer the flesh [blood] to the demon. They also make tamales of the seeds of the blite and of maize, which latter they call the body of their god. They eat these tamales with a grand celebration. . . .

22.

This is the festival which they call *Eçalcoaliztli*, that is, "eating *eçatl*," which refers to a custom of eating some cooked maize. The demon who is honored in this performance is *Queçalcoatl* that is, "serpent with beautiful plumes." This demon was god of the breeze, and was said to be the friend or superior of another whom they called *Tlaloc* and brother of another whom they call *Xubotl*, he whom they set up either in a painted or a carved figure over their games of chance. He is also "*Queçalcoatl*" when he is invoked. In this feast the Indians cook much maize and beans (which they call *poçole*). In the paintings this god is represented standing on a mat of rushes. In this festival the Indians offered sacrifices of their sex organs, which rite they called *motepulico*; that is, "this filth sacrificed." Some say that they do this in order to induce their god to give them offspring. In this festival also the *maçaguales* [serfs] took *coas* (or sticks with which they used to dig their maize) at the foot of the wall and each one, great and little, placed on it several leaves of maize, that is, of *poçole* or cooked maize. In this festival they offered to the demon male children, recently born, which they call *teyeoque*. This is a ceremony which they have. In this ceremony they invite their elders to feast, as Christians do at the baptism of their children. . . .

23.

This festival is called *Tecuilhuil* in which the young men carry on their shoulders the demon, dressed to represent a parrot and in a litter lined with leaves and stalks of maize, playing flutes and other different instruments before the demon. In his hand they place a scepter of feathers which they call *yolotopili* or "heart staff." The demon whose festival is represented here is called *Tlacopilli*, that is, "excellent lord". . . .

24.

This festival is called among the Indians *Huei tecuilhuil* and the demon to whom they celebrate this festival is called *Uztocivall*. They sacrifice in this festival a woman whom they call *Xilone*. . . . that is, Young Corn Ear, for in this festival, in distinction to the one just mentioned, they employ such unripened ears of corn, called *xilotl*, which they offer before the demon on this day. . . .

25.

This festival is called *Michaylhuil*, that is, "festival of the dead," because in it they celebrated the rites concerned with their dead children. They danced with profound grief, and sacrificed boys. The demon whom they honored in this ceremony was *Tilaciuán* that is, "of whom we are slaves." He was the same as *Tezcatipocatl*, or "Smoking Mirror," except that they paint him in this picture with different colors, and according as they give him different names. Others call this festival *Moruchimaca*, because in it they drape garlands of roses on the demon. To this *Tezcatipocatl* are dedicated the *teucales* [pyramid temples]. Him they call *Tlacuchcalcatl* and *Uicinauatl* . . . that is, "now comes his [divinity]." In reverence of him the principal Indians assume these names. . . .

26.

This figure represents a festival which the Indians call *Huei mical huil*, which means "great festival." Others call it *Xucull gueci*, because in it they set up a tree, very tall, on the top of which is seated an Indian. Other Indians knock down from his perch this one who is seated above, going up and clambering on several ropes which are tied to the tree. They take some tamales which they call *teuçoalle*, that is, "bread of god." Trying one of them to outdo the other, they knock him to the ground, where the Indians kill him in order to partake of him as "holy bread." Afterwards they throw into the fire that which they have knocked off of the tree. They put the head in a bath, so that although it be baked, no harm shall happen to the hair or the head until later they eat it baked. The skinned head they set up on another body and dance with it before the demon, called *Hucteul*, to whom the festival is dedicated. . . .

27.

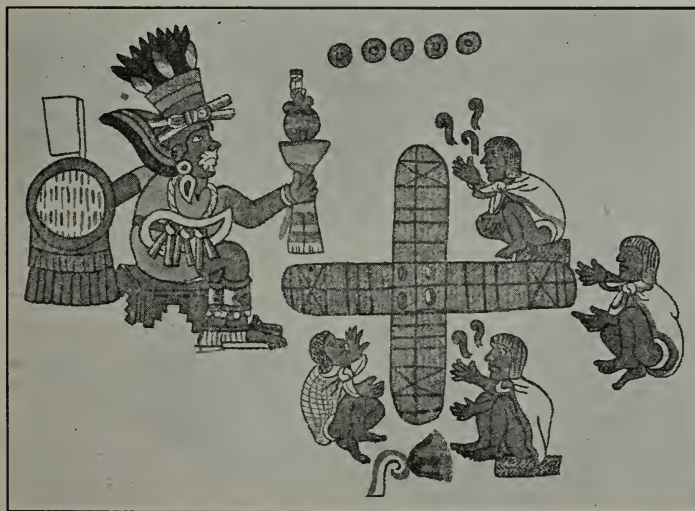
This illustration represents the festival which the Indians call *Uchpaniztli*, that is to say "by sweeping," because in it they place in the hand of the demon whom they call *Toci* (that is, "our eagle") a broom. In this festival they sacrifice Indian women to the *cues* [temples] which stand in front of the highways. They have great dances and drinking bouts. The Indian women whom they sacrifice, these they skin, and other women dress in their hides to dance before this demon. . . .

28.

The Indians call this festival *Pachli*, that is, certain brownish plants like tangled cords which the Indian collect from the rose trees, because they grow very long and large. In these dances they make garlands of this plant, for the head. The demon whom they celebrated in this festival was *Teçcatepoca*, that is, "Smoking Mirror." They sacrifice Indians, throwing them alive



28



48

into the fire. Some escape and run away. The place of sacrifice is up some high steps, up which those whom they have to sacrifice pass up, right to the top. For this reason others call this festival *Teutleco*, that is to say, "going up to the god." In this festival they celebrate also another demon, whom they call *Ome tuchtli*, who is the god of drunken debauches. . . .

29.

This festival the Indians called *Hue pachtli*; that is to say, "Great Herb" (of the sort which was mentioned in the account of that other festival, just above). They say this was a festival of the pueblo, and for that reason they paint a hill and over it a snake, which they cover with tamale dough which they call *coaltica qui pepechoa*. This demon was called *Suchi-queçale*. They also sacrifice an Indian woman. On this same day they celebrated another festival which is called *Pilauana*, that is, "drunkenness of the children"; because in this festival the boys dance with the girls. Then they give each other to drink until they intoxicate themselves and some of them commit with one another foulnesses and fornications. These children were already little chieftans, of the age of nine or ten years. This debauch did not occur everywhere, but only in the *tlalhuicas*, that is, the level irrigated plains, where the sun is hot. . . .

30.

The Indians call this festival *Quechule*, that is, "arrow," (which they call in their own language *mitl*) because in this festival they make many arrows. With these arrows and with bows they dance on the day in question before the demon, whom they call *Mizcoatl*. From the name of this demon certain important men in the pueblo are themselves named, a fact referred to above. Then on another day (the following one) they go hunting with these arrows. For four days beforehand they eat only bread and water, abstaining from chile-peppers and all other foods. Once a day towards evening they [go] to the demon. They represented the demon as having his eyes blackened, with a thing like a white stick through the nostrils, and in his hand an ornamented staff like a sickle, which they called *Mixcoatl zonoquilt*. . . .

31.

The Indians called this festival *Panquezalizti* which was the greatest festival of their year. In this they celebrated to the demon whom they called *Vicilopoxtli* who was of their gods the friend of *Tezcatpocall*. This festival is called *Panquezalizti* because in it they place on the head of *Uicilopochtli* a broad affair which they call *panitl*, of a blue color, (which latter the Indians call *texutli*). They equip the image also in colored paper, and with a shield of leather in his hand. In this festival there was sacrificed in Mexico a huge crowd of people of those whom they had seized from Tlascala and Guaxocingo. . . .

32.

This festival was called *Atemuztle*, that is, "the coming down of the water;" because in it they ask their god for water so they might begin planting the maize. The demon who was honored in this festival was called *Tlaloc*, that is, "with earth;" because his influence was in that which germinates in the ground. The caciques and lords observed this festival for the most part, and these lords sacrificed slaves on the elevations. They also offer feathers, and they drown in the water children, that the god may give them rain.

33.

This festival the Indians call *Tititl*. . . . The demon whom they celebrate in this festival is called *Çiuacoatl* that is, Snake Woman. In this festival they celebrate the feast of the dead. Their festival was celebrated after this fashion. They took a faggot of *ocotl*, which in Spain is called pitchwood and they dress it up in a mantle or gown. If the dead person had been a woman, they dressed the faggot in her petticoats and they put in front of her vessels or cooking pots and other household utensils. If the dead person had been a chief and a valiant man they dressed the faggot in a rich mantle and waist-cloth and labret and a handful of pitchwood. The labret which they call *teçacatl* was made of amber or crystal. This they are accustomed to wear, when they drink or dance in the ceremonies, hanging down from a hole which they have pierced above the chin through the lip. And they also put on the image the dead man's plumes, which he wore tied to his occiput, and which they call *tlalpiloni*, and in addition, much perfume. Then they seated the image on a sleeping-mat above his *equipal*, and they put there much food and they invited the principal men there. Then they put fire to the pitchwood and everything which they had put there burned up. This memorial which their sons or relatives performed every year in their honor, they called *Quixebilotia*, which means that they set up his figure or memorial.

34.

This festival governs twenty-five days according to the Indians. It is celebrated on the feast of San Gilberti the Confessor. The demon in whose memory this festival is celebrated is called *Xuctecull*. In the festival they sacrifice two Indians, one of whom is called *Ixcocauque*, and the other *Comulco*. They have tremendous drinking bouts in these areitos, or dances. This festival is called *Ixcalli*. . . . It fell on the fourth day of February. In this festival nobody ate anything excepting gruel made of the blite, and bread. This however is only in Mexico.

Ixcalli, on the fourth of February, the last festival of the year according to the reckoning of the Indians, governs twenty-five days. It falls on the feast of St. Gilbert the Confessor.

35.

This festival is one of the extravagant observances. It is called *Xuchitl huill*, that is, Feast of the Flowers. In this festival the young men (in Aztec *telpochitl*) perform a dance, each one in his own barrio. This fiesta falls twice in a year, or, to speak more exactly, every two hundred days. In this way it may occur once in a given year, and twice in other years. For this festival they save up the shells of the eggs of domestic fowls, sacking up each hen. Then in the dawn they pour them out along the roads and streets in celebration of the mercy of their god in having given them fowls. The demon whom they celebrate in this festival is called *Chicome xuchitl* that is to say, "Seven Flowers."

36.

This is a festival which the Indians call *Ce xuchitl*, that is the festival "One Flower." This falls twenty days after the one just mentioned. In it the same performances are held as in the preceding one.

37.

This festival is the festival of a demon whom they believe in here, called *Papaztac*, one of the four hundred drunken gods whom the Indians believe in. They were given different names, but were referred to all together as the *totochtli* or "Rabbits." When the Indians had their corn cut and gathered, they had drinking bouts and danced invoking this demon. And others of the four hundred, whose pictures are on following pages, they did the same.

38.

This is an illustration of a grand debauch which a pueblo called *Tepuztlan* celebrates as a ceremony. The custom was that when any Indian dies drunk, the others of this pueblo held a grand ceremony, with axes of copper, which they use for cutting wood, in their hands. This pueblo is part of *Yauhtepec*, [and its inhabitants were] vassals of the Marquis of the Valley.

39.

This demon is one of the four hundred demons of drunkenness already spoken of. He is called *Yautengante*.

40.

This is another of the same series (that is, of the drunken gods). His name is *Tultegate*.

41.

This was another of the four hundred whom the Indians called gods of wine and of drunken people, namely, *Poctegatl*, because it was like medicine to them, this wine was.

42.

This demon is like those just mentioned. He is called *Tezcaçongatl*. . . .

43.

This demon is called *Tlallegayoa*, in which ceremony (the one celebrated to this demon) there goes in front an Indian dressed in the skin of a female monkey, for which animal their word is *cuçumate*.

44.

The accompanying demon is called *Colhuaca cuigatl*.

45.

This accompanying demon was called *Totul tegatl*.

46.

The accompanying demon was called *Mayavel* that is, "Maguey" because the juice which came out of the maguey was intoxicating and they dance.

47.

The following demon was called *Tilichuçi*.

48.

This is a game which the Indians play. They call it *patole*. It is like a game of dice, played upon a painted mat, as in the accompanying picture. Those who are masters at this game invoked this demon, whom they call *Macuilsuchiitl*, that is, "Five Roses." They invoked him in order that he should give them a winning day.

49.

This demon is one of the gods which the Indians believe in. His name was *Queçalcoatl*, or "Feathered Serpent." He is considered the god of the Breeze. They represented his face from the nose down as wood, in the form of a trumpet, through which blew the wind, which they say was from this god. On top of his head they place a cap of tiger skin, and from it there issued as a crest, a bone, to which were attached many feathers of ducks native to the country, called *xumul*; and last of all there was attached by its beak a bird which they call *vicicili* [humming bird]. When this festival was observed the Indians offered to this idol *ayulli*, certain (melons of the country). Of this one they say that he was the son of another god whom they call *Mictlan tecutli* who is lord of the place of the dead; and son also of another idol which they call *Xulul*, that is, a sort of bread which they have, made of blite and maize.

51.

The accompanying figure represents also one of the four hundred gods which they call gods of the drunken. They call him *Yxdilçi*.

52.

This demon they have as a god. He is called *Techalotl* which is the name of an animal like a little skunk. These animals live between the rocks in holes. This is not one of the four hundred drunken gods.

53.

This illustration is the figure of a demon whom the Indians have for the god of the place where the dead went. This place they call *Michtlam*, that is, "place of the dead." This word certain interpreters have appropriated for the idea "hell." This is a great mistake, for the Indians had no word for that idea. Thus when the Friars preached to them that if they were ill-observers of the faith of God, "they would go to *Mictlan*," it does not matter to the Indians, because in any case they expected to go there. Rather than to use the word *Ichatlaca teculotl*, that is "to go to the house of the Devil," the Indians say merely *Mictlan tecutl*, or "Lord of the Place [of the Dead]."

54.

This illustration is an illustration of what occurred when a ruler or principal man dies; namely, they wrapped him in a shroud seated on his haunches, as the Indians are accustomed to sit. And his relatives gather much wood. Then they incinerate him, as the ancient Romans were accustomed to do it, in the time of their heathenism. Before him they sacrificed one or two slaves, so that they could bury them with him, after they had burned them. Also in certain parts of the country where so doing was the custom, there were buried with them their women; for they said that yonder these women were to wait on them. They buried each man's treasure also, in cases where they have any.

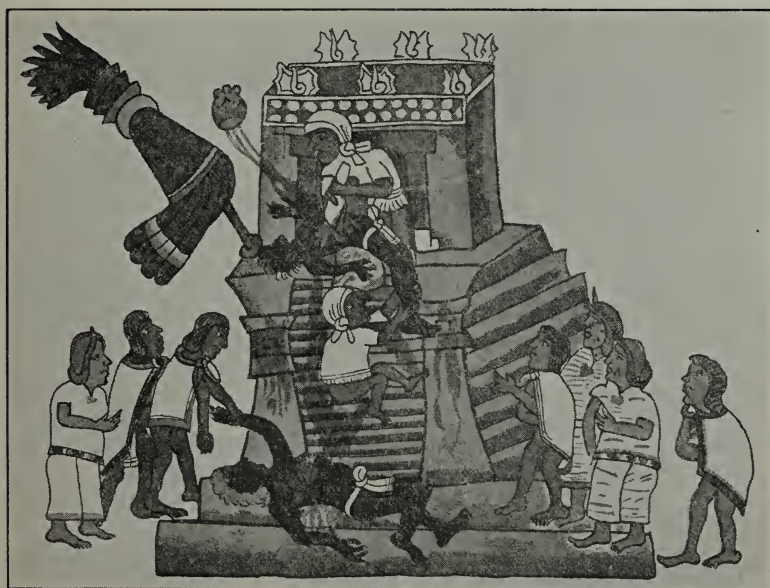
55.

This illustration is an illustration of the same observance. The dead man's children and relatives wailed for him. They also gave him *cavavatl* [cacao, chocolate] for his journey. The figure which represents this is the second of the two on the following page.

The first illustration represents the place where they buried the dead. Accordingly here are the remains.



55



58

56.

This picture represents the observances held when a merchant has died. They cremate him and bury him with his effects, and tiger-skins and anything else he possessed, putting around him in a circle the guitars and gold and *oyeles* and fine stones which they had; and feathers, as though in *Micllan* (which is their name for the place of the dead) he might have use for this property.

57.

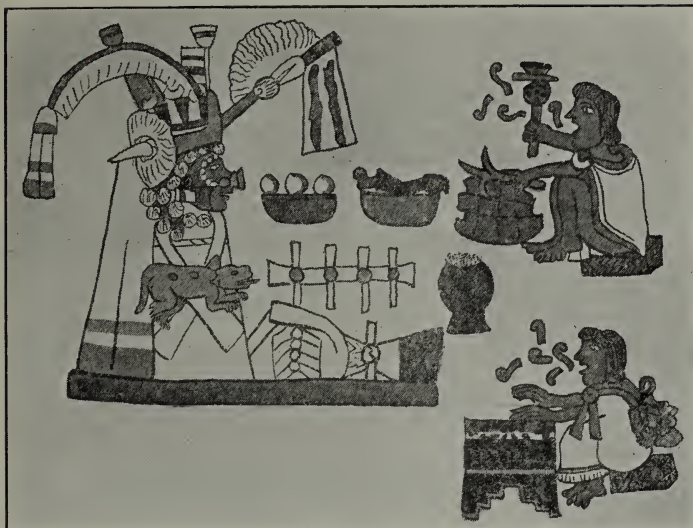
This figure represents the observances held when a young man died. That which they set out for him was tamales and beans. They also gave him to carry on his back a load of paper if he had it. He also had tied on like a plume a paper, which they call *amatl*. But with all this burden or heap of things he was to go to meet the Lord of *Micllan*.

58.

This is a staff which has on it a drapery, like the Manga de Cruz like those which they make here of feathers. The device was among these Indians used like a banner, which they set up in front of the temple when they sacrifice. It is the first thing in the following picture. The rest of the picture represents the scene when they sacrifice Indians—how they take the victim up to the top and throw him on his shoulders upon a stone and cut out his heart. Another man holds him by the feet so that he shall not struggle. It was the *tlamacaz*, that is the chief of the executioners, who killed him. In order to do this, he tied up his head and his hair with a white mantle, in order to cut out the heart and anoint with it the snout of the demon.

59.

This picture is when they elevate someone to be a lord or official, or to hold some honorable office in their state. Let us note what they did first when they elevated a man to be a lord of this sort. He stood unclothed, naked, before certain ones who spoke and said how, and with what solicitude, he should exercise his office. Him they place in front of the demon whom they hold to be the god of fire, called *Xucteuitl*, where they offer sacrifice of incense which they call *copale*. They give him a new name, and he loses the one which he formerly had. They order him to sleep one night to the middle of the night or of the sky, naked, without any covering. They gave him as insignia to denote his office a mantle and a receptacle of yellow gourd with colored streamers through its handles, and like a burden they hung it around his neck. They place him thus burdened before the demon mentioned above, where he promises faithfulness in his office, and to serve him [the divinity] and to sweep his courtyard, himself or his subjects. He fasts four days, eating only bread and water toward evening, this and nothing else. Every time that anybody, being ordered, goes anywhere, they give him drink, to him and to those who go with him.



60



61

60.

This is a representation of what happened when the Indians held a memorial ceremony for their dead, in the festival which they call *Titill*. As was said (in speaking of this festival on a previous page) concerning the figure of him for whom the observances were held, it was like that which is herewith represented. . . . They put in his nose an affair of blue paper which they call *yacaxuill*, that is, "plant nose." Back of his face which is of wood they filled up with chicken feathers, the small white kind. For a crest they put a stick covered with paper, which they call *amatl*, and on the head for a headdress they put some plants which they call *malimali*. From the occiput there hangs down another crest which they call *pantolole* [maize-flag], which is made of paper. Through his shoulders the figure was stuffed with papers, and he had a lip-plug and around his neck there was hung as an ornament a little animal which they call *jilotl*. The ornament they call *xilocuzcatl* [maize-jewel], but it was made for this ceremony out of painted paper. There was also a staff covered with paper in the form of crosses. Below there was a load of sheets of paper, and cacao for food. In front there were two or three or more Indians, who were seated and sang, and beat a kettle-drum which they call *vevett*. . . . This they did every year up to four years after the death of the deceased, and no more.

61.

In this picture is shown the abominable custom the Indians had, the day they sacrificed men to their idols. Namely, right there before the demon whom they call *Mictlan tecutl* (that is, lord of the place of the dead, as described in another place), they set out many cooking pots of the human flesh [just mentioned] and give it out and serve it to the important personages and officials and to those officials called *tamagatl* [*tlamacaz*, sacrificing priest] who serve at the temple of the demon, and these in turn share that which has been given them with their friends and relatives. They say that it tastes like the pork which they eat today, and for that reason pork is much desired among them.

62.

This is a minor sacrifice consisting of incense, or paper with blood, which the Indians offer to their gods. Here it ought to be observed that every five [days] they hold a *cue* or place of sacrifice, so that all can make offerings there in common. In addition to the above small [place of] sacrifice they have every twenty days a greater one which was dedicated to an idol of one of their gods for whom they exhibit devotion. Each barrio has another idol. They say it was he who guarded the barrio. To him they run with their petitions in time of necessity. Here it must be noted that no one asks except for temporal things; for example, for food or (long) life. This is as far as their prayers go. On the day on which the festival of this idol falls, the people of that particular barrio offer him solemnities. The other barrios do not.



65



66

63.

This is a representation of a goddess which the Indians have, called *Atla-coaya*, that is, dark water or sad affair. In this festival they sacrifice Indians, and give them as food to those gods which are called *Totochilti* that is, Rabbits. These were at least four hundred in number.

64.

This is the figure of a divinity which they call *Cicimiltl*, which means an arrow. They paint this divinity like a dead body from which the flesh has already disappeared, a body without any tissue on the bones. It is represented with hearts and hands hung about the neck and head.

65.

This is a representation of the baths of the Indians, called by them *temezcale*. In the picture they have put at the door an Indian who was an adviser for their sicknesses. When a sick man goes to the bath they make for him offerings of incense (which they call *copale*) to the idol. They hold in veneration the black body of the idol, whom they call *Tezcatēcōatl*, one of the greater of their gods. They commit in these baths other foul debaucheries. It is the custom among them for many men or women to bathe together entirely naked, and there takes place inside this bath house much foulness and sin.

66.

This is a sort of diabolical leechcraft which the Indians practice. When anyone was sick they summon the doctor (man or woman) and then [ask] the said doctor to see what the outcome of the illness will be. Then they place in front of the doctor and in front of the sick man an idol, the name of which idol is *Quetzalcoatl*, that is, Feather Snake. The doctor was in the middle, on a mat, and on this mat was placed a mantle of white cotton. He took in his hand twenty grains of maize, (which is the grain from which they make bread). He throws them upon the mantle as when one throws dice. If these grains fall so as to leave in the middle an opening or [word illegible], in such fashion that the grains are all around it, it was a sign that he would be buried there, that is, that he would die of the disease. If one grain fell upon another the doctor announced that his disease had come upon him on account of sodomy. If the grains of maize separated, one half to one side and the other half to the other side, in such a way that it was possible to draw a straight line through the middle without touching a single grain, it was a sign that the sickness would leave the man, and he would get well.



67



76

67.

This is another picture, where is shown the way which the Indians have of doing penance. Namely, they set up on a high place in a seated position an idol which they call *Miclantecutli*, that is, "Lord of the Dead." Before this idol they sacrifice [blood] from their ears, and others from their tongues, and others from the calves of their legs. The method was to thrust through their ears and through their tongues thorns, very sharp. This was the way they did penance. . . .

73.

These bundles are bundles of a root (*called ocpatli*) with which they make their wine.

This is the woman who carried the wine to the rest until they became drunk.

76.

This is a demon, much worshipped in their ceremonies, who always has a great thirst for human blood. Thus on each and every occasion when there was time and opportunity for him to be worshipped, there might be no excuses offered. It is to be noted that in addition to the sacrifice to this demon being performed at all sorts of hours, there was a law that no one might enter his temple until there had been sacrificed a jar of human blood; and in addition to this he who came up to offer a sacrifice, had to hold up his right hand smeared with blood. This they did so that this demon would be friendly to them at the time of their death. In worshipping him they place at his feet many skulls and dead bones, signifying that he was Lord of Death. In offering this blood they put a ladder up behind him, and climb up on it and pour the blood upon his head, symbolizing thus his acceptance of it. They pour this sacrifice over his head so that the god shall not be forgetful at the time of the devotee's death, of this sacrifice which he had offered. Having the mouth of the idol open and the tongue stuck out and bloody signifies that they were never to say that they did not have a sacrifice which they might offer to him.

45. RELIGIOUS SONGS AND PRAYERS OF THE NAVAHO¹

Collected and translated by

WASHINGTON MATTHEWS

1. SONG IN THE ROCK

In the house of the Red Rock,
There I enter;
Halfway in, I am come.
The corn-plants shake.

In the house of Blue Water,
There I enter;
Halfway in, I am come.
The plants shake.

2. SONG IN THE ROCK

At the Red Rock house it grows,
There the giant corn-plant grows,
With ears on either side it grows,
With its ruddy silk it grows,
Ripening in one day it grows,
Greatly multiplying grows.

At Blue Water house it grows,
There the giant squash-vine grows,
With fruit on either side it grows,
With its yellow blossom grows,
Ripening in one day it grows,
Greatly multiplying grows.

¹Washington Matthews, "The Night Chant," *Memoirs of the American Museum of Natural History*, volume 6, 1902, pages 77, 78, 81, 85, 143; and, the same author, "Navaho Legends," *Memoirs of the American Folk-Lore Society*, volume 5, 1897, pages 27, 28. The Navaho live in northern New Mexico and Arizona.

3. MOUNTAIN SONG

In a holy place with a god I walk,
In a holy place with a god I walk,
On Tsisnadzini with a god I walk,
On a chief of mountains with a god I walk,
In old-age wandering with a god I walk,
On a trail of beauty with a god I walk.

4. A SONG TO SWEEP OFF WITH

The corn grows up; the rain descends,
I sweep it off, I sweep it off.

The rain descends; the corn grows up.
I sweep it off, I sweep it off.

5. FREE TRANSLATION OF A PRAYER

In Tse'gihi,
In the house made of dawn,
In the house made of the evening twilight,
In the house made of the dark cloud,
In the house made of the he-rain,
In the house made of the dark mist,
In the house made of the she-rain,
In the house made of pollen,
In the house made of grasshoppers,
Where the dark mist curtains the doorway,
The path to which is on the rainbow,
Where the zigzag lightning stands high on top,
Where the he-rain stands high on top,
Oh, male-divinity!
With your moccasins of dark cloud, come to us. . . .
In beauty I walk.
With beauty before me, I walk.
With beauty behind me, I walk.
With beauty below me, I walk.
With beauty above me, I walk.
With beauty all around me, I walk. . . .
It is finished in beauty.

6. A MOUNTAIN CHANT SONG

The voice that beautifies the land!
The voice above,
The voice of the Thunder,
Among the dark clouds
Again and again it sounds,
The voice that beautifies the land.

The voice that beautifies the land!
The voice below,
The voice of the grasshopper,
Among the flowers and grasses
Again and again it sounds,
The voice that beautifies the land.

7. BLUEBIRD SONG

Just as daylight *Sialia* calls.
The bluebird has a voice,
He has a voice, his voice melodious,
His voice melodious that flows in gladness.
Sialia calls! *Sialia* calls!

46. MELANESIAN RELIGION¹

By R. H. CODRINGTON

The religion of the Melanesians is the expression of their conception of the supernatural, and embraces a very wide range of beliefs and practices, the limits of which it would be very difficult to define. It is equally difficult to ascertain with precision what these beliefs are. The ideas of the natives are not clear upon many points, they are not accustomed to present them in any systematic form among themselves. An observer who should set himself the task of making systematic enquiries, must find himself baffled at the outset by the multiplicity of the languages with which he has to deal. Suppose him to have as a medium of communication a language which he and those from whom he seeks information can use freely for the ordinary purposes of life, he finds that to fail when he seeks to know what is the real meaning of those expressions which his informant must needs use in his own tongue, because he knows no equivalent for them in the common language which is employed. Or if he gives what he supposes to be an equivalent, it will often happen that he and the enquirer do not understand that word in the same sense. A missionary has his own difficulty in the fact that very much of his communication is with the young, who do not themselves know and understand very much of what their elders believe and practice. Converts are disposed to blacken generally and indiscriminately their own former state, and with greater zeal the present practises of others. There are some things they are really ashamed to speak of; and there are others which they think they ought to consider wrong, because they are associated in their memory with what they know to be really bad. Many a native Christian will roundly condemn native songs and dances, who, when questions begin to clear his mind, acknowledges that some dances are quite innocent, explains that none that he knows have any religious significance whatever, says that many songs also have nothing whatever bad in them, and writes out one or two as examples. Natives who are still heathen will speak with reserve of what still retains with them a sacred character, and a considerate missionary will respect such reserve; if he should not respect it the native may very likely fail in his respect for him,

¹From chapter 7 of R. H. Codrington, *The Melanesians, Their Anthropology and Folk-Lore*, 1891.

and amuse himself at his expense. Few missionaries have time to make systematic enquiries; if they do, they are likely to make them too soon, and for the whole of their after-career make whatever they observe fit into their early scheme of the native religion. Often missionaries, it is to be feared, so manage it that neither they nor the first generation of their converts really know what the old religion of the native people was. There is always with missionaries the difficulty of language; a man may speak a native language every day for years and have reason to believe he speaks it well, but it will argue ill for his real acquaintance with it if he does not find out that he makes mistakes. Resident traders, if observant, are free from some of a missionary's difficulties; but they have their own. The 'pigeon English,' which is sure to come in, carries its own deceits; 'plenty devil' serves to convey much information; a chief's grave is 'devil stones,' the dancing ground of a village is a 'devil ground,' the drums are idols, a dancing club is a 'devil stick.'² The most intelligent travellers and naval officers pass their short period of observation in this atmosphere of confusion. Besides, every one, missionary and visitor, carries with him some preconceived ideas; he expects to see idols, and he sees them; images are labelled idols in museums whose makers carved them for amusement; a Solomon islander fashions the head of his lime-box stick into a grotesque figure, and it becomes the subject of a woodcut as 'a Solomon Island god.' It is extremely difficult for any one to begin enquiries without some prepossessions, which, even if he can communicate with the natives in their own language, affect his conceptions of the meaning of the answers he receives. The questions he puts guide the native to the answer he thinks he ought to give. The native, with very vague beliefs and notions floating in cloudy solution in his mind, finds in the questions of the European a thread on which these will precipitate themselves, and, without any intention to deceive, avails himself of the opportunity to clear his own mind while he satisfies the questioner.

Some such statement as this of the difficulties in the way of a certain knowledge of the subject is a necessary introduction to the account which is given here of the religion of the Melanesians; and it is desirable that the writer should disclaim pretensions to accuracy or completeness. The general view which is presented must be taken with the particular examples of Melanesian belief and customs in matters of religion which follow.

²It may be asserted with confidence that a belief in a devil, that is of an evil spirit, has no place whatever in the native Melanesian mind. The word has certainly not been introduced in the Solomon or Banks Islands by missionaries, who in those groups have never used the word devil. Yet most unfortunately it has come to pass that the religious beliefs of European traders have been conveyed to the natives in the word 'devil,' which they use without knowing what it means. It is much to be wished that educated Europeans would not use the word so loosely as they do.

(1) The Melanesian mind is entirely possessed by the belief in a supernatural power or influence, called almost universally *mana*.³ This is what works to effect everything which is beyond the ordinary power of men, outside the common processes of nature; it is present in the atmosphere of life, attaches itself to persons and to things, and is manifested by results which can only be ascribed to its operation. When one has got it he can use it and direct it, but its force may break forth at some new point; the presence of it is ascertained by proof. A man comes by chance upon a stone which takes his fancy; its shape is singular, it is like something, it is certainly not a common stone, there must be *mana* in it. So he argues with himself, and he puts it to the proof; he lays it at the root of a tree to the fruit of which it has a certain resemblance, or he buries it in the ground when he plants his garden; an abundant crop on the tree or in the garden shews that he is right, the stone is *mana*,⁴ has that power in it. Having that power it is a vehicle to convey *mana* to other stones. In the same way certain forms of words, generally in the form of a song, have power for certain purposes; a charm of words is called a *mana*. But this power, though itself impersonal, is always connected with some person who directs it; all spirits have it, ghosts generally, some men. If a stone is found to have supernatural power, it is because a spirit has associated itself with it; a dead man's bone has with it *mana*, because the ghost is with the bone; a man may have so close a connexion with a spirit or ghost

³Professor Max Müller, in his Hibbert Lectures of 1878, did me the honour of quoting the following words from a letter. 'The religion of the Melanesians consists, as far as belief goes, in the persuasion that there is a supernatural power about belonging to the region of the unseen; and, as far as practice goes, in the use of means of getting this power turned to their own benefit. The notion of a Supreme Being is altogether foreign to them, or indeed of any being occupying a very elevated place in their world. . . . There is a belief in a force altogether distinct from physical power, which acts in all kinds of ways for good and evil, and which it is of the greatest advantage to possess or control. This is Mana. The word is common I believe to the whole Pacific, and people have tried very hard to describe what it is in different regions. I think I know what our people meant by it, and that meaning seems to me to cover all that I hear about it elsewhere. It is a power or influence, not physical, and in a way supernatural; but it shews itself in physical force, or in any kind of power or excellence which a man possesses. This Mana is not fixed in anything, and can be conveyed in almost anything; but spirits, whether disembodied souls or supernatural beings, have it and can impart it; and it essentially belongs to personal beings to originate it, though it may act through the medium of water, or a stone, or a bone. All Melanesian religion consists, in fact, in getting this Mana for one's self, or getting it used for one's benefit—all religion, that is, as far as religious practices go, prayers and sacrifices.'

⁴The word *mana* is both a noun substantive and a verb; a transitive form of the verb, *manag*, *manahi*, *manangi*, means to impart *mana*, or to influence with it. An object in which *mana* resides, and a spirit which naturally has *mana*, is said to be *mana*, with the use of the verb; a man has *mana*, but cannot properly be said to be *mana*.

that he has *mana* in himself also, and can so direct it as to effect what he desires; a charm is powerful because the name of a spirit or ghost expressed in the form of words brings into it the power which the ghost or spirit exercises through it. Thus all conspicuous success is a proof that a man has *mana*; his influence depends on the impression made on the people's mind that he has it; he becomes a chief by virtue of it. Hence a man's power, though political or social in its character, is his *mana*; the word is naturally used in accordance with the native conception of the character of all power and influence as supernatural. If a man has been successful in fighting, it has not been his natural strength of arm, quickness of eye, or readiness of resource that has won success; he has certainly got the *mana* of a spirit or of some deceased warrior to empower him, conveyed in an amulet of a stone round his neck, or a tuft of leaves in his belt, in a tooth hung upon a finger of his bow hand, or in the form of words with which he brings supernatural assistance to his side. If a man's pigs multiply, and his gardens are productive, it is not because he is industrious and looks after his property, but because of the stones full of *mana* for pigs and yams that he possesses. Of course a yam naturally grows when planted, that is well known, but it will not be very large unless *mana* comes into play; a canoe will not be swift unless *mana* be brought to bear upon it, a net will not catch many fish, nor an arrow inflict a mortal wound.

(2) The Melanesians believe in the existence of beings personal, intelligent, full of *mana*, with a certain bodily form which is visible but not fleshly like the bodies of men. These they think to be more or less actively concerned in the affairs of men, and they invoke and otherwise approach them. These may be called spirits; but it is most important to distinguish between spirits who are beings of an order higher than mankind, and the disembodied spirits of men, which have become in the vulgar sense of the word ghosts. From the neglect of this distinction great confusion and misunderstanding arises; and it is much to be desired that missionaries at any rate would carefully observe the distinction. Any personal object of worship among natives in all parts of the world is taken by the European observer to be a spirit or a god, or a devil; but among Melanesians at any rate it is very common to invoke departed relatives and friends, and to use religious rites addressed to them. A man therefore who is approaching with some rite his dead father, whose spirit he believes to be existing and pleased with his pious action, is thought to be worshipping a false god or deceiving spirit, and very probably is told that the being he worships does not exist. The perplexed native hears with one ear that there is no such thing as that departed spirit of a man which he venerates as a ghost but his instructor takes to be a god, and with the other that the soul never dies, and that his own spiritual interests are paramount and eternal. They themselves make a clear distinction between the existing, conscious, powerful, disembodied spirits of the dead, and other spiritual beings that never have been men at all. It is true that the two orders of beings get confused in native language and thought, but their confusion begins at one end and the

confusion of their visitors at another; they think so much and constantly of ghosts that they speak of beings who were never men as ghosts; Europeans take the spirits of the lately dead for gods; less educated Europeans call them roundly devils. All Melanesians, as far as my acquaintance with them extends, believe in the existence both of spirits that never were men, and of ghosts which are the disembodied souls of men deceased: to preserve as far as possible this distinction, the supernatural beings that were never in a human body are here called *spirits*, men's spirits that have left the body are called *ghosts*.

There is, however, a very remarkable difference between the natives of the New Hebrides and Banks' Islands to the east, and the natives of the Solomon Islands to the west; the direction of the religious ideas and practices of the former is towards spirits rather than ghosts, the latter pay very little attention to spirits and address themselves almost wholly to ghosts. This goes with a much greater development of a sacrificial system in the west than in the east; and goes along also with a certain advance in the arts of life. Enough is hardly known of the Santa Cruz people, who lie between, to speak with certainty, but they appear to range themselves, as they rather do geographically, on the side of the Solomon Islands. In Fiji it is the established custom to call the objects of the old worship gods; but Mr. Fison was 'inclined to think all the spiritual beings of Fiji, including the gods, simply the Mota *tamate*,' i.e. ghosts; and the words of Mr. Hazelwood, quoted by Mr. Brenchley (*Cruise of the Curaçoa*, p. 181), confirm this view. Tuikilakila told one of the first missionaries how he proposed to treat him. 'If you die first,' said he, 'I shall make you my god.' And the same Tuikilakila would sometimes say of himself, 'I am a god.' It is added that he believed it too; and his belief was surely correct. For it should be observed that the chief never said he was or should be a god, in English, but that he was or should be a *kalou*, in Fijian, and a *kalou* he no doubt became; that is to say, on his decease his departed spirit was invoked and worshipped as he knew it would be. He used no verb 'am' or 'shall be'; said only 'I a *kalou*.' In Fiji also this worship of the dead, rather than of beings that never were in the flesh, accompanies a more considerable advance in the arts of life than is found in, for example, the Banks' Islands. It is plain that the natives of the southern islands of the New Hebrides, though they are said to worship 'gods,' believe in the existence and power of spirits other than the disembodied spirits of the dead, as well as of the ghosts of men. When a missionary visitor to Anaiteum reported that the people 'lived under the most abject bondage to their *Natmases*,' and called these 'gods,' he was evidently speaking of the ghosts, the *Natmat* of the Banks' Islands, for the word is no doubt the same. The belief in other spirits not ghosts of the dead, appears equally clear in the account given of the sacred stones and places, which correspond to those of the northern islands of the same group, and in the 'minor deities' said to be the progeny of Nugerain, and called 'gods of the sea, of the land, of mountains and valleys,' who represent the *wui* of Lepers' Island and Araga. There does not appear to be

anywhere in Melanesia a belief in a spirit which animates any natural object, a tree, waterfall, storm or rock, so as to be to it what the soul is believed to be to the body of a man. Europeans it is true speak of the spirits of the sea or of the storm or of the forest; but the native idea which they represent is that ghosts haunt the sea and the forest, having power to raise storms and to strike a traveller with disease, or that supernatural beings never men do the same. It may be said, then, that Melanesian religion divides the people into two groups; one, where, with an accompanying belief in spirits never men, worship is directed to the ghosts of the dead, as in the Solomon Islands; the other, where both ghosts and spirits have an important place, but the spirits have more worship than the ghosts, as is the case in the New Hebrides and in the Banks' Islands.

(3) In the Banks' Islands a spirit is called a *vui*, and is thus described by a native who was exhorted to give as far as possible the original notion conveyed among the old people by the word, and gave his definition after considerable reflection:—'What is a *vui*? It lives, thinks, has more intelligence than a man; knows things which are secret without seeing; is supernaturally powerful with *mana*; has no form to be seen; has no soul, because itself is like a soul.' But though the true conception of a *vui* represents it as incorporeal, the stories about the *vui* who have names treat them as if they were men possessed of supernatural power. The *vui* of the Northern New Hebrides are the same. . . .

These spirits, such as they are, have no position in the religion of the Solomon Islands; the ghosts, the disembodied spirits of the dead, are objects of worship; the *tindalo* of Florida, *tidadho* of Ysabel, *tinda'o* of Guadalcanar, *lio'a* of Saa, *'ataro* of San Cristoval. But it must not be supposed that every ghost becomes an object of worship. A man in danger may call upon his father, his grandfather, or his uncle; his nearness of kin is sufficient ground for it. The ghost who is to be worshipped is the spirit of a man who in his lifetime had *mana* in him; the souls of common men are the common herd of ghosts, nobodies alike before and after death. The supernatural power abiding in the powerful living man abides in his ghost after death, with increased vigour and more ease of movement. After his death, therefore, it is expected that he should begin to work, and some one will come forward and claim particular acquaintance with the ghost; if his power should shew itself, his position is assured as one worthy to be invoked, and to receive offerings, till his cultus gives way before the rising importance of one newly dead, and the sacred place where his shrine once stood and his relics were preserved is the only memorial of him that remains; if no proof of his activity appears, he sinks into oblivion at once. An admirable example of the establishment of the worship of a *tindalo* in Florida is given in the story of Ganindo, for which I am indebted to Bishop Selwyn. There was a gathering of men at Honggo to go on a head-hunting expedition under the leading of Kulanikama the chief (himself afterwards a ghost of worship), and Ganindo was their great fighting man. They went to attack Gaeta, and Lumba of Gaeta shot Ganindo near the collar-bone

with an arrow. Having failed in their purpose they returned to Honggo, and said they, 'our friend is dead.' But as he still lived they took him over to Nggaombata in Guadalcanar, brought him back again, and put him on the hill Bonipari, where he died and was buried. Then they took his head, wove a basket for it, and built a house for it, and they said he was a *tindalo*. 'Let us go and take heads,' said they; so they made an expedition. As they went they ceased paddling in a quiet place and waited till they felt their canoe rock under them; then said they, 'Here is a *tindalo*.' To find out who he was they called the names of *tindalos*, and when they called the name of Ganindo the canoe shook again. In the same way they learnt what village they were to attack. Returning successful, they threw a spear into the roof of Ganindo's house, blew conches, and danced around it crying, 'Our *tindalo* is strong to kill.' Then they sacrificed to him, fish and food. Then they built him a new house, and made four images for the four corners, one of Ganindo himself, two of his sisters, and another. Then, when eight men had carried up the ridge covering for the house, eight men translated the relics to the shrine. One carried the bones of Ganindo, another his betel-nuts, another his lime-box, another his shell trumpet. They all went in crouching, as if under a heavy weight, and singing slowly, '*Ma-i-i, ma-i-i, ka saka tua*, hither, hither, let us lift the leg;' the eight legs were lifted together, and again they chanted '*ma-i-i, ma-i-i*,' and at the last *mai* the eight legs went down together. With this solemn procession the relics were set upon a bamboo platform, and sacrifices to the new *keramo* were begun; by Nisi first, then by Satani, then by Begoni, the last, at whose death some four years ago the sacrifices ceased, and the shrine fell to ruin before the advance of Christian teaching. To the natives of Florida this Ganindo was a *tindalo*, a ghost of worship, a *keramo*, a ghost powerful for war; he would be spoken of now by some Europeans as a god, by others as a devil, and the pigeon-English speaking natives now, who think that 'devil' is the English for *tindalo*, would use the same word.

47. THE HEATHEN PRIESTS OF EAST GREENLAND¹

By W. THALBITZER

It is a notorious fact that Eskimo culture and daily life is pervaded throughout by a spirit of religion. Not only is the greater part of the unwritten Eskimo literature of a mythical and ritualistic character, but we find a religious atmosphere haunting even their profane legends and historical or semi-historical tales. . . .

The exponents of the Eskimo's religion are called *angakoks* (*angakut*) and are in fact their national priests; they resemble in many respects the shamans of the Siberian tribes. I call them priests, because they are men, who after a long period of training and initiation have acquired a special capacity for entering into communication with the gods of the people and with the whole spiritual world in which this people believes. They are able, in contradistinction to laymen, to see the spirits, obtain answers from them and to bring them to interfere in the life of mankind. Thus in virtue of this natural aptitude and training, they are to be regarded as mediators between common mortals and the supernatural powers of the universe. . . .

The Eskimo religion knows two supreme divinities: the moon, *Aningáhk*, which is regarded as a man, a hunter, who catches sea-animals, who has his house, his hunting grounds and his implements of the chase in the sky; and the old nameless woman of the sea, whose house lies far away at the bottom of the ocean, and who rules over the marine seals, whales and polar bears. Finally the people of *Ammassalik* speak of a third power in the sky, an old woman of the name of *Asiak*, who procures rain by shaking a skin drenched in urine down upon the earth so that a shower of drops is sprinkled upon it.

The *angakok*, and the *angakok* alone, is able to communicate with these powers by the aid of his spirits; and it is by no means all *angakoks*, but only those who are fully trained, and only the greatest among these, who can travel to the gods through the air and "see" them. Their bodies are left for lifeless on the earth, while their soul, freed from the body, roams through the universe.

Part of the *angakok*'s functions is to heal the sick. The *angakok* effects this by enquiring of his spirits whither the sick man's soul has gone, bidding them to seek for it and fetch it home again. For, according to Eskimo notions, all

¹From W. Thalbitzer, "The Heathen Priests of East Greenland," pages 447-464, of *Verhandlungen des XVI Internationalen Amerikanisten-Kongresses, Wien, 1908* (1910).

disease is nothing but loss of a soul; in every part of the human body (particularly in every joint, as for instance, in each finger joint) there resides a little soul, and if a part of the man's body is sick, it is because the little soul has abandoned that part. In most cases the loss of the soul is regarded as due to one of the following causes: either that evilly disposed persons have driven it out by means of magic, or that higher powers, the moon for instance, have removed it as a punishment for men's sins (some sacrilege, breach of tabu, or other). The sick man's relatives send for the angakok, who passes a night summoning his spirits, finding by their aid the spot on the earth, or in the sky or in the sea, where the lost fragment of the soul is, in order afterwards to have it fetched and returned to its place in the sick man's body, who is thereby healed.

Up to the close of the 19th century the religious life of the East-Greenlanders at Ammassalik pulsed with well-nigh unimpaired vigour. As late as 1894, the year in which the Danish state founded its colony over there, there were twelve angakoks belonging to the place, being about the same number as in 1884 when G. Holm wintered there. The proportion was about 1 angakok to 34 persons. Since the last named date the population has increased from 410 to 470, but the number of angakoks has sunk during this time from 12 to 5, being the number of the trained angakoks who lived there during my stay there from 1905 to 1906. . . .

Every angakok has, as a rule, had several paid teachers and has received instruction in different branches. *Mitsuarnianga* mentioned *Imaalikutjuk* as his teacher in the actual angakok craft; but, on his being more closely questioned, it appeared that what he had really learnt during the three days his teaching lasted, was only the first directions as how he should prepare himself "for rubbing the stone," which amounts to the same as initiation in the power of acquiring attendant spirits (genii). At the early age of seven or eight the future angakok begins to receive instruction from an older angakok, who is willing and eager to confide his secret knowledge to him. He teaches him first how he is to go in perfect secrecy and fetch a special kind of sea-weed from the beach when the tide is low, and wash himself with it over his whole body; how then he is to go into the depths of the land among the high mountains to the place where he has selected his grindstone, a large stone with a flat upper surface, often found lying near a lake, a river, a high declivity or a cave. I have seen one lying at the end of an old Eskimo grave. Proceeding according to fixed rules the novice seeks for a little stone to be used for grinding against the flat surface of the large one. Not seldom a little crustacean from the sea or river is laid between the two stones which are rubbed together.

There sits the disciple hour after hour rubbing the little stone in a circle against the large one, in anxious expectation of what is to appear. According to the tradition quite a definite event is to take place. The bear of the lake will rise up, go towards him and eat him, whereby he "dies" i.e., loses his consciousness. It will spit him out again and then leave him. After the

lapse of an hour he returns to consciousness, his skeleton clothes itself in flesh again, and his garments come rushing up to him one by one until at last he emerges fully dressed. Every summer of this and the following years he keeps on rubbing the stone and thereby on different occasions acquires his attendant spirits, who are said to be his very own, and whose names he alone knows, and he alone may use. During the time he is rubbing the stone, he must fast i. e. he may not eat the entrails of animals. Similarly he may not work in metal or engage in any noisy occupation whatsoever.

It should be observed, that it is not the disciple himself who announces himself as a candidate for discipleship; it is the older angakok who exhorts the young one, a boy, whom he thinks well adapted for initiation in the religious mysteries, to receive training, in order that a knowledge of the highest powers in existence may be preserved for the coming generation.

Mitsuarnianga was so young when he underwent his first training that he had nothing to pay his first teacher with. On the other hand he paid all his later teachers, partly with bear and seal skins, partly with implements. One of them received from him a sledge and a dog. When the angakok *Takiwnalikitseq* had taught him iliseetsoq lore (ilseenilisaat), i. e., such magic means by the aid of which the attempts of the enemy can be warded off, or even pain or disaster brought upon them as a vengeance, he gave him in payment a large fine bear-skin, a sealing bladder and a skin thong in return for the wisdom imparted to him.

In order to summon a spirit or soul it behooves one merely to know its name and to utter it. Thus it is clear that the angakok novice cannot summon the spirits that are to be his attendant genii, on the first occasion; they come of their own accord, or else he lights upon them unexpectedly when he is out rambling alone. But when he has once spoken with them and learnt their names he will henceforward be able to summon them again.

As for the sacred or mystic language in which the angakok holds converse with his spirits, *Mitsuarnianga* declared that no special teaching was required in order to learn it. As, however, it is identically for all angakoks and even, as it seems, more or less the same for angakoks from all quarters, it must be a really stereotyped language preserved through many centuries. Presumably every angakok learns a great part of it by attending the angakoks' colloquies with their spirits, when they conjure them up in their huts; those that are training to become angakoks impress these words on their memory with particular care. The words are not sheer abracadabra, but obsolete or metaphorically used Eskimo words, a kind of inherited art language, which contributes in a high degree to the solemn and mystical character of the spiritual gathering. The religious forms or expressions themselves are made no secret of: only the way in which the disciple receives his training is wrapped in mystery.

During the whole course of his discipleship the angakok novice carefully conceals the fact, that he is receiving instruction, rubbing the stone and having

meetings with his spirits. But when—after a novitiate of from five to ten years—he finally grows into a fullfledged angakok, his house-mates begin to have an inkling about it and to pass their comments on the fact. One fine evening he at last goes and proclaims himself to the world: angakittuppoa, “I am an angakok,” and admonishes the others to extinguish the lamps, in order that he may for the first time give them a proof of his prowess.

There is only one circumstance, which can compel a novice to divulge his secret, before his time has come, and that is if he falls mortally ill. For by divulging that he is an angakok he will be able to save his life, though indeed at the sacrifice of his career as angakok. . . .

The secret novitiate lasts in no case more than twelve years, if the disciple ever intends to make use of his powers as an angakok.

There are four main occasions in which the services of an angakok at Ammassalik will be called in request, and when he must summon his spirits to a meeting under the floor of the huts: dearth of sea animals in the sea; snow-masses blocking the ways to the hunting-places (on the land or on the fjord-ice); a man's loss of soul (illness); a married woman's barrenness. Any one of these circumstances is sufficient reason for him to summon a meeting of the spirits, when the inhabitants of the place or even people from a distance so demand. Let us now see how a meeting of this kind proceeds in the hut.

The other men in the house fetch out the angakok's skins (atwtaat) from his seat on the platform, two dry hairless skins, which they hang like a double covering or curtain in front of the inner end of the underground passage-way (kattak, the inner door-opening; doors are unknown).

Here, in the front of the wall itself, stand two massive high stones as door-posts framing in the door-way; the latter appears like a dark hole leading downwards and forwards towards the exit, which lies about half a yard or a yard lower than the floor of the hut. Besides the skins, which hang by straps and thongs in front of this aperture, another skin is spread on the floor just in front of it; this is the angakok's place when he is holding a spiritual meeting (torniwoq). When he sits there on the floor, with his legs stretched out at the same height as his seat, he has his back turned to all of the audience, who, according to their custom, sit in their places on the platform along the back wall of the house. His face is turned towards the covered entrance, i. e., towards the sea. His heels rest on the lowest corner of one of the hanging skins which is turned up in such a way that he can set the skins in motion with his feet and produce a noisy rattling with them. His drum lies on a flat stone on the floor to his right. His arms are tightly bound behind his back, being lashed from the hands to the elbows with a long thong which is tied in knots. It is a part of his art to free his hands in the dark and afterwards, before the lamps are lit, to stick them back again in the still fastened thongs. The angakok is supposed to fly through the air (towards the interior of the country) in his doubled-up posture with the hands bound behind him.

It has not yet been mentioned that the angakok brings with him a little characteristic instrument, the so-called makkortaa; it consists of a round, flat piece of black skin, from five to five and a half centimetres in diameter, which is held tightly in the hollow of the hand, while it is struck or rapped-on with a carved wooden stick with the other hand. By the aid of this little instrument the angakok produces a loud rhythmic knocking as a preliminary to his meeting with the spirits below the ground. When the lamps in the hut have been extinguished, this knocking goes on unintermittingly, while the angakok's voice, keeping time to the knocking, is heard plaintively babbling: aata-aata-aata aahtaah; at the same time the skins rattle and the drum begins to move and to drone faintly. The noise and the movements get gradually wilder and wilder. The drum, they say, rocks or dances standing erect on the floor, and now and then it springs up on the angakok's forehead or the crown of his head, drumming frantically in restless agitation. These are the signs that the angakok's inner vision is "dawning," or, in other words, that his soul is about to pass over into the "other world." When this feeling comes over him, he sinks down into the depths of the earth, crying in mingled despair and ecstasy: aatjiwitjiwitjiwit ho-hooi-ho-hooi! and at the same moment his drum begins to move in another time.

Teemiartissaq, who furnished me with a great part of this information, had the notion that the angakok at this moment rises and sinks like a man about to drown: "he comes up a third time, before he goes down for good." *Ajukudooq* called my attention to the fact that only the angakok's soul, not his body sinks below the ground. This takes place gradually, and his spirit (*taartaa*) rises up and enters into him through his anus. It makes its exit afterwards by the same way. His body is thus like a house which changes tenants.

While these mysteries are in progress, the angakok's soul rises several times up from the depths and enters the body turn by turn with his *taartaat* (this word itself seems to mean "successors"); there can only be one soul at a time in it. But at the moments when the angakok's own consciousness is in it, his spirit monsters, or the manlike animals belonging to the sacred ritual, come—one at a time—stalking into the hut and filling the inmates with religious awe and shuddering. These animals, each of which has his own special name and voice, are called *qimarhrat*, "they that cause to flee." One of them, *Amooq* ("he that tugs or pulls at something") cries in a sustained and protracted roar "amoo, amoo!" while, invisible in the dark, it tramps along the platform, passing behind those that sit there; at last it disappears through the passage-way. Another monster cries "ongaa, onga!" (avaunt, avaunt!), a third "I will warm my fingers" as it tries to touch those present and warm itself on their naked bodies. There are several similar creatures; most of them seem to be common to all angakoks in contradistinction to their personal attendants, the *taartaat*, which are identical with the spirits called by other Eskimo *tornat* (or *torngat*) and which the angakok has acquired by rubbing the stone during his novitiate.

These attendant spirits have peculiar names and shadows, houses and hunting implements. They are originally nature spirits, often souls of animals that have been formed into men and women. But they all belong to the "other world" (asia), which is only visible to the angakoks. Otherwise they have their being in the same visible world as men—the Eskimo do not see anything self-contradictory in this—and they belong to three kinds of people; each of which have their own special dwelling places and peculiarities: *Timerseet*, who live in the interior of the country, *Eajuütsaat* (= *Taarajuütsaat*) "semi-men" who live under the ground close to men's huts, and *Innertiwin*, "the fire-people," who live on the beach under the rocks of the coast, where the water is shallow. The latter are said to have houses with windows and they can, as distinct from the others, make long journeys in umiaks over to the west coast of Greenland where they buy metal and European clothes. *Timerseet* follow the course of the rivers out to sea when they want to hunt seal. All these beings have the language of men but speak it more or less awry, for instance with distorted mouths, or lispingly, or merely indistinctly on account of obsolete or foreign words.

This last feature applies also to the beings which come from the sea to serve the angakok during the sacred rites. One of these is called *Aperqit* "the consulted one, the oracle," which sits down by the edge of the sea below the hut and helps the angakok who has been summoned to cure the disease, by answering questions as to the nature of the disease, i. e., as to which souls have deserted the sick man, and as to the place in the sea or on the land where they are now to be found. When the answer has been given, it is for the attendant spirits to search out and fetch back the lost soul.

The other spiritual helper which the angakok has in the sea is *Toornartik*, the *Toornarsuk* of the West Greenlanders. As the people of Ammassalik believe, *toornartik* is an animal-like creature in the sea, and, it appears, that there are at least two of them. It was described to me as 3 yards long, 1 yard broad across the chest, with the upper part like a man, with arms and legs, but the lower parts looking like a seal.

It is not related to the woman of the sea and has nothing to do with her. Nor is it counted among the angakok's *taartaat tornat*; it is an independent creature which lives in the sea and can be used by the angakok for different purposes. It serves as his guide, when he flies off to the sea-woman's house with his spiritual retinue, and it hastens the speed of the journey by speeding along in the front.

Last but not least, it is from this being that the angakok receives replies to his questions. *Aperqit* is only an intermediary, a messenger between *Toornartik* and the heathen priest. From the hut the angakok addresses his questions to *Aperqit*, the attendant spirit who listens at the water's edge and thence passes on the questions out to the sea.

I received from the now living angakoks an accurate description of the way the angakok takes to the woman of the sea, and of that which he takes to the

moon; and moreover of the obstacles which he and his spirits meet with on their way. These journeys are attended with great toil, hardships and perils, and the angakok will only be instigated to such exertions when it is a question of life or death for a whole settlement or for a single individual whose life is valued so much that his relations are ready to pay the price the angakok demands for the exercise of his double function of doctor and priest.

But, even without such weighty grounds, the angakok frequently summons one or more of his spirits to a meeting in the hut. There are lazy angakoks and diligent angakoks. "A diligent angakok," so the saying goes, "torniwoqs almost every night the whole winter through." "No singing is so lovely as the singing of the spirits; the singing of mortals is nothing to it," said one of the angakoks to me.

48. THE RELIGION OF THE AMAZULU OF SOUTH AFRICA AS TOLD BY THEMSELVES¹

By CANON CALLAWAY

DIVINERS

The condition of a man who is about to be an inyanga² is this: At first he is apparently robust; but in process of time he begins to be delicate, not having any real disease, but being very delicate. He begins to be particular about food, and abstains from some kinds, and requests his friends not to give him that food, because it makes him ill. He habitually avoids certain kinds of food, choosing what he likes, and he does not eat much of that; and he is continually complaining of pains in different parts of his body. And he tells them that he has dreamt that he was being carried away by a river. He dreams of many things, and his body is muddled and he becomes a house of dreams. And he dreams constantly of many things, and on awaking says to his friends, "My body is muddled to-day; I dreamt many men were killing me; I escaped I know not how. And on waking one part of my body felt different from other parts; it was no longer alike all over." At last the man is very ill, and they go to the diviners to enquire.

The diviners do not at once see that he is about to have a soft head.³ It is difficult for them to see the truth; they continually talk nonsense, and make false statements, until all the man's cattle are devoured at their command, they saying that the spirit of his people demands cattle, that it may eat food.

So the people readily assent to the diviners' word thinking that they know. At length all the man's property is expended, he being still ill; and they no longer know what to do, for he has no more cattle, and his friends help him in such things as he needs.

At length an inyanga comes and says that all the others are wrong. He says, "I know that you come here to me because you have been unable to do any thing for the man, and have no longer the heart to believe that any inyanga can help you. But, my friends, I see that my friends, the other

¹Selected from pages 259-330 of the Rev. Canon H. Callaway, "The Religious System of the Amazulu," 1870, reissued as *Publications of the Folk-Lore Society*, volume 15, London, 1884. Only the English translation is given here: the original has the Zulu text as well.

²Diviner, physician, or shaman.

³A *soft head*, that is, impressible. Diviners are said to have *soft heads*.

izinyanga,⁴ have gone astray. They have not eaten impepo. They were not initiated in a proper way. Why have they been mistaken, when the disease is evident? For my part, I tell you the izinyanga have troubled you. The disease does not require to be treated with blood. As for the man, I see nothing else but that he is possessed by the Itongo. There is nothing else. He is possessed by an Itongo. Your people⁵ move in him. They are divided into two parties; some say, 'No, we do not wish that our child should be injured. We do not wish it.' It is for that reason and no other that he does not get well. If you bar the way against the Itongo, you will be killing him. For he will not be an inyanga; neither will he ever be a man again; he will be what he is now. If he is not ill, he will be delicate, and become a fool, and be unable to understand any thing. I tell you you will kill him by using medicines. Just leave him alone, and look to the end to which the disease points. Do you not see that on the day he has not taken medicine, he just takes a mouthful of food? Do not give him any more medicines. He will not die of the sickness, for he will have what is good given to him."

So the man may be ill two years without getting better; perhaps even longer than that. He may leave the house for a few days, and the people begin to think he will get well. But no, he is confined to the house again. This continues until his hair falls off. And his body is dry and scurfy; and he does not like to anoint himself. People wonder at the progress of the disease. But his head begins to give signs of what is about to happen. He shows that he is about to be a diviner by yawning again and again, and by sneezing again and again. And men say, "No! Truly it seems as though this man was about to be possessed by a spirit." This is also apparent from his being very fond of snuff; not allowing any long time to pass without taking some. And people begin to see that he has had what is good given to him.

After that he is ill; he has slight convulsions, and has water poured on him, and they cease for a time. He habitually sheds tears, at first slight, and at last he weeps aloud, and in the middle of the night, when the people are asleep, he is heard making a noise, and wakes the people by singing; he has composed a song, and men and women awake and go to sing in concert with him.

In this state of things they daily expect his death; he is now but skin and bones, and they think that to-morrow's sun will not leave him alive. The people wonder when they hear him singing, and they strike their hands in concert. They then begin to take courage, saying, "Yes; now we see that it is the head."⁶

Therefore whilst he is undergoing this initiation the people of the village are troubled by want of sleep; for a man who is beginning to be an inyanga

⁴Plural of inyanga.

⁵*Your people move in him*, that is, the Amatongo, a class of spirits.

⁶Lit., We see the head, viz., that it is affected in that way which is followed by the power to divine.

causes great trouble, for he does not sleep, but works constantly with his brain; his sleep is merely by snatches, and he wakes up singing many songs; and people who are near quit their villages by night when they hear him singing aloud, and go to sing in concert. Perhaps he sings till the morning, no one having slept. The people of the village smite their hands in concert until they are sore. And then he leaps about the house like a frog; and the house becomes too small for him, and he goes out, leaping and singing, and shaking like a reed in the water, and dripping with perspiration.

At that time many cattle are eaten. The people encourage his becoming an inyanga; they employ means for making the Itongo white, that it may make his divination very clear. At length another ancient inyanga of celebrity is pointed out to him.⁷ At night whilst asleep he is commanded by the Itongo, who says to him, "Go to So-and-so; go to him, and he will churn for you emetic-ubulawo, that you may be an inyanga altogether." Then he is quiet for a few days, having gone to the inyanga to have ubulawo churned for him; and he comes back quite another man, being now cleansed and an inyanga indeed.

And if he is to have familiar spirits, there is continually a voice saying to him, "You will not speak with the people; they will be told by us every thing they come to enquire about." And he continually tells the people his dreams, saying, "There are people⁸ who tell me at night that they will speak for themselves to those who come to enquire." At last all this turns out to be true; when he has begun to divine, at length his power entirely ceases, and he hears the spirits who speak by whistlings speaking to him, and he answers them as he would answer a man; and he causes them to speak by asking them questions; if he does not understand what they say, they make him understand every thing they see. The familiar spirits do not begin by explaining omens which occur among the people; they begin by speaking with him whose familiars they are, and making him acquainted with what is about to happen, and then he divines for the people.

This then is what I know of familiar spirits and diviners.

If the relatives of the man who has been made ill by the Itongo do not wish him to become a diviner, they call a great doctor to treat him, to lay the spirit, that he may not divine. But although the man no longer divines, he is not well; he continues to be always out of health. This is what I know. But although he no longer divines, as regards wisdom he is like a diviner. For instance, there was Undayeni. His friends did not wish him to become a diviner; they said, "No; we do not wish so fine and powerful a man to become a mere thing which stays at home, and does no work, but only divines." So they laid the spirit. But there still remained in him signs which caused the people to say, "If that man had been a diviner, he would have been a very great man, a first-class diviner."

⁷That is, by the Itongo in a dream.

⁸People, viz., the dead, the Amatongo.

As to the familiar spirits, it is not one only that speaks; they are very many; and their voices are not alike; one has his voice, and another his; and the voice of the man into whom they enter is different from theirs. He too enquires of them as other people do; and he too seeks divination of them. If they do not speak, he does not know what they will say; he cannot tell those who come for divination what they will be told. No. It is his place to take what those who come to enquire bring and nothing more. And the man and the familiar spirits ask questions of each other and converse.

When those who come to seek divination salute him, he replies, "O, you have come when I am alone. The spirits departed yesterday. I do not know where they are gone." So the people wait. When they come they are heard saluting them, saying, "Good day." They reply, "Good day to you, masters." And the man who lives with them also asks them saying, "Are you coming?" They say, they are. It is therefore difficult to understand that it is a deception, when we hear many voices speaking with the man who has familiar spirits, and him too speaking with them. . . .⁹

POSSESSION BY SPIRITS

When the Amatongo make a man ill, he cries "Hai, hai, hai." They cause him to compose songs, and the people of his home assemble and beat tune to the song the Amatongo have caused him to compose,—the song of initiation,—a song of professional skill.

Some dispute and say, "No. The fellow is merely mad. There is no Itongo¹⁰ in him." Others say, "O, there is an Itongo in him; he is already an inyanga."

The others say, "No; he is mad. Have you ever hidden things for him to discover by his inner sight, since you say he is an inyanga?"

They say, "No; we have not done that."

They ask, "How then do you know he is an inyanga?"

They say, "We know it because he is told about medicines, which he goes to dig up."

They reply, "O! he is a mere madman. We might allow that he is an inyanga if you had concealed things for him to find, and he had discovered what you had concealed. But you tell us what is of no import, as you have not done this."

As they are talking thus and disputing about concealing things for him to find, at night when he is asleep he dreams that the man of his people who is dead, and who is causing him to begin to be an inyanga, tells him saying, "They were disputing with each other, saying you are not an inyanga."

⁹Pages 259-267.

¹⁰Singular of Amatongo, spirits of the dead.

He who is beginning to be an inyanga asks, "Why do they say I am not an inyanga?"

He replies, "They say you are not an inyanga, but a mere mad man; and ask if they have hidden things for you to discover, since the others say you are an inyanga."

He says, "Tell me who they are who say so."

He replies, "So-and-so and So-and-so were disputing."

The man asks, "Do you say they lie when they say so?"

He replies, "Be quiet. Because they say so, I say you shall be a greater inyanga than all others, and all men in the world shall be satisfied that you are a great inyanga, and they shall know you."

The man who is beginning to be an inyanga says, "For my part I say they speak the truth when they say I am mad. Truly they have never hidden anything for me to find."

Then the man who was an inyanga, he who is initiating him, says, "Just be quiet. I will take you to them in the morning. And do you appear on a hill; do not come upon them suddenly; but appear on a hill which is concealed, and cry 'Hai, hai, hai'; cry thus on the hill which is concealed, that they may hear. When you cry 'Hai, hai, hai', if they do not hear, then go on to a hill which is open; do not expose yourself much; as soon as you expose yourself, cry 'Hai, hai, hai', so that they may just hear. When they hear that it is you, go down again from the hill, and return to the one which is concealed. So I say they will see and understand that they have spoken of a man who is beginning to be a doctor; they shall know by that, that when they said you were a mad man and not an inyanga they were mistaken."

So he does so. He cries "Hai, hai, hai," on a hill which is hidden; they do not hear him distinctly; they hear only a continual sound of Nkene, nkene, nkene, nkene. One of them says, "It sounds as though there was some one singing." Others say, "We do not hear. We hear only an echo."

The Itongo comes to him and tells him that they cannot hear, and bids him go out a little on the open hill, and then return again to the hill which is hidden.

So he departs at the word of the Itongo, and goes out to the open hill, and cries "Hai, hai, hai"; and they all hear that it is he. They are again disputing about him, and as soon as they hear that it is he, they say, "Can it be, sirs, that he comes about the matter we were disputing about, saying, he is mad?"

Others say, "O, why do you ask? He comes on that account, if indeed you said he was not an inyanga, but a madman."

The great man of the village to which the inyanga is approaching, says, "I too say he is mad. Just take things and go and hide them, that we may see if he can find them."

They take things; one takes beads, and goes and hides them; others take picks, and go and hide them; others hide assagais; others bracelets; others

hide their sticks, others their kilts, others their ornaments, others their pots; others hide baskets, and say, "Just let us see if he will find all these things or not." Others hide cobs of maize; others the ears of amabele, or sweet cane, or of ujiba, or the heads of upoko.

Some say, "O, if he find all these things, will he not be tired? Why have you hidden so many?"

They say, "We hide so many that we may see that he is really an inyanga."

They reply, "Stop now; you have hidden very many things."

They return home, and wait. Then the Itongo tells him on the concealed hill; for it had already said to him, "Keep quiet; they are now hiding things; do not begin to appear. They wish to say when you find the things that you saw when they hid them. Be quiet, that they may hide all the things; then they will be satisfied that you are an inyanga." Now the Itongo tells him, "They have now hidden the things, and gone home. It is proper for you now to go to the home of the people who say you are mad and not an inyanga."

So he comes out on the open mountain, and runs towards their home, being pursued by his own people who are seeking him, for he went out during the night, and they did not hear when he went out very early in the morning, when it was still dark, when the horns of the cattle were beginning to be just visible. He reaches their home, and his own people who were looking for him, and have now found him, come with him. On his arrival he dances; and as he dances they strike hands in unison; and the people of the place who have hidden things for him to find, also start up and strike hands; he dances, and they smite their hands earnestly.

He says to them, "Have you then hid things for me to find?"

They deny, saying, "No; we have not hidden things for you to find."

He says, "You have."

They deny, saying, "It is not true; we have not."

He says, "Am I not able to find them?"

They say, "No; you cannot. Have we hidden then things for you to find?"

He says, "You have."

They deny, declaring that they have not done so. But he asserts that they have.

When they persist in their denial, he starts up, shaking his head. He goes and finds the beads; he finds the picks, and the kilts, and the bracelets; he finds the cobs of maize, and the ears of the amabele and ujiba and of upoko; he finds all the things they have hidden. They see he is a great inyanga when he has found all the things they have concealed. . . .¹¹

THE DIVINER MISTAKEN

Once at Pietermaritzburg a heifer belonging to Mr. G., my white master, was lost. We looked for it, but could not find it. We then asked Mr. G. to

¹¹Pages 273-279.

give us a shilling, that we might enquire of a diviner, for we were now troubled with looking for it, and did not know where to look for it any further. He gave us a shilling, and we went to a diviner who lives near the Zwartkop. On our arrival we found him sitting in the cattle-pen; and we saluted, saying, "Eh, dear sir," and sat down.

They saluted us, and we replied.

The diviner's people asked us whence we came.

We told them we came from Pietermaritzburg, and had come to enquire of the diviner.

They said, "Why have you come here?"

We told them we had come on our own account, some cattle¹² having been lost. We then asked for snuff, and they gave us some and we took it; and after that the diviner said, "Let us go yonder outside the village."

He went out, and we followed him. He said to us, "Strike the ground, that I may understand, my friends, what is the reason that you have come to me."

We smote our hands together, and said, "Hear."

He said, "You are in trouble."

We said, "Hear."

He said, "Let me just understand what kind of a bullock it is?"

We smote our hands together.

He said, "It is a cow."

We smote our hands.

He said, "No; it is an ox."

We smote our hands.

He said, "No; it is not an ox."

We smote our hands.

He said, "You are in trouble, lads."

We smote our hands.

He said, "But the cow was lost a long time ago."

And there he spoke truly.

We smote our hands.

He said, "Just let me understand if it was stolen by any one."

We smote our hands.

He said, "No, it was not stolen by men; but it is still living."

We smote our hands.

He said, "It is one that is lost."

And there too he spoke the truth.

We smote with our hands.

He said, "Let me just understand of what colour it is."

¹²They say "some cattle," although it was but one that was missing, that they may not give the diviner too much knowledge. They leave him to discover the deception; and if he does not, but proceeds to speak as though many cattle were lost, they know he does not understand divination.

We smote with our hands.

He said, "It is a red and white cow."

But there he made a guess, and did not speak truly.

We smote our hands.

He said, "No; it is a heifer; it is not yet a calf."

We smote our hands.

And there too he spoke truly.

He said, "Let me understand if the heifer is still living or not."

We smote our hands.

He said, "No, the heifer is dead."

We smote our hands.

He said, "No, it is still living."

He said, "Let me just understand where it is."

We smote our hands.

He said, "It is in the mimosa thorn-country."

We smote our hands.

He said, "Just let me understand in what part of the thorn-country it is."

We smote our hands.

He said, "It has gone down the Umsunduze."

We smote our hands.

He said, "Just let me understand if it is still living."

We smote our hands.

He said, "It is still living, and eating umtolo and umunga. Go and look for it there, and you will find it."

We thought we understood that he had now told us the place, for for some time we had not known where to go to look for it.

Then we gave him the shilling, and returned to Pietermaritzburg. When we came to Mr. G. we told him that the diviner said it was in the thorn-country, and that we were to go and look for it down the Umsunduze.

He told us to go and look for it in the place mentioned by the diviner. We went to look for it, going down the Umsunduze. As we went along we looked for it, going towards the thorn-country which he had pointed out. At length we got as far as T.'s, and sought for it in that neighbourhood; we could not find it, for the thorns were very thick. As we went we enquired at all the native villages in the thorn-country. The people said they knew nothing about it; and others told us to go to T., the white man who ate up the cattle of the people that were lost. But we were afraid to go to him, for he is a passionate white man who beats any coloured men whom he does not know if he see them passing through his land. So we went back to Pietermaritzburg without going to T.; and told Mr. G. that we had not found the heifer at the place pointed out by the diviner. So he told us to give up the search. We did so, and that was the end of it. . . .¹³

¹³Pages 300-304.

ANOTHER INCIDENT

John went to enquire of a diviner when his sister was ill, wishing to know what was the cause of her illness. But when he smote the ground he smote mechanically, assenting to every thing the diviner said, for he said to himself, "For my part I know nothing. It is the diviner that shall point out to me the real facts of the case."

The diviner reproved him, saying, "Surely, my friend, did you ever enquire of a diviner in this way before?"

John replied in the affirmative, saying, "O, it is I indeed who enquire,¹⁴ for I am now the responsible head of our village; there is no other man in it; there is no one but me."

The diviner said, "I see. You do not know how to enquire of a diviner." At length he devised a plan with one of his own people, saying, "This man has not the least notion of divination. Just go and ask him, that he may tell you why he has come, that you may smite the ground for me in a proper manner."

So indeed the man said to John, "The diviner says you do not know how to divine. Tell me the cause of your coming. You will see that we smite the ground for him vehemently when he speaks to the point; and if he does not speak to the point, we do not smite much."

John said in answer, "For my part I do not understand what you say. I have merely come to the diviner for no other purpose than to hear of him the nature of a disease. I did not come to talk with you about it. For my part I shall hear from the diviner what the disease is."

So he refused to tell him; and the man went back to the diviner; he said, "Let him come to me again, that we may hear."

So John again smote the ground vehemently, and thus expressed his assent to every thing the diviner said. Until he became quite foolish, and said, "O, my friend, I see indeed that you do not know how to enquire of a diviner."

He said this because there was no point where John assented very much, nor where he assented slightly, that he might see by his assenting slightly that he had not hit the mark. He expected if he hit the mark John would smite the ground vehemently; but if he missed it he would strike gently. So he left off divining, and said, "No, my friend, I never met with a man who enquired like you." He could do nothing.

John said, "O then, my friend, as you do not see the nature of the disease, now give me back my shilling, that I may betake myself to another diviner."

So the diviner gave him back the shilling. His name was Um-ngom'-u-ng'-umuntu.¹⁵

¹⁴The head of the village alone enquires of the diviner, either in person or by his representatives. Great men send messengers to the diviner, and do not go in person.

¹⁵Pages 328-330.

49. THE DAKOTA ELK CEREMONY¹

By ALICE C. FLETCHER

Among the Siouan family of Indians there are societies, religious in character, which are distinguished by the name of some animal. Each society has a ritual composed of chants and songs to be sung during different parts of the ceremonies, having words describing in simple and direct terms the act which accompanies the music. These musical rituals, it is often claimed, have been received in a mysterious or supernatural manner, and are therefore regarded as possessing a religious power. Every member is taught these songs after his reception into the society, and the music is thus handed down from generation to generation. Other songs are sometimes sung which have been composed by members and thus belong to the society. Some societies admit women to membership, through their own visions, or occasionally by those of their husbands, but more generally by means of the visions of male relatives. The women sit in a place assigned them, and those possessing clear soprano voices are instructed in the music, and accompany in high tenor voices the men who sing in unison. The songs of a society are rarely sung, except during the ceremonies to which they belong or on some occasion of danger or quest for property. The ritual chants and songs belonging to the great tribal religious ceremonies are strictly guarded and never sounded at any other time. Those belonging to minor societies it is permissible to use occasionally.

All the societies have certain articles or symbols which are always used or at least present during a ceremony or festival, as, the pipe, the sacred dish, the fire, the sweet grass or aromatic shrub, the prepared space of earth, the symbols formed upon it, or marked upon some reflecting surface, or on the skin of an animal. The rites peculiar to each society vary and there are generally articles used characteristic of the animal whose name the mystery bears. Each festival of the same society may differ in minor points, as an assembly only takes place in accordance with a vision, the details of which must be scrupulously fulfilled. A vision, I was frequently told, comes of God, and a man who does not act it all out faithfully commits a sin, and evil fortune will befall him or his parents in consequence of the dereliction.

¹From Alice C. Fletcher, "The Elk Mystery or Festival [of the] Ogallala Sioux," *Reports of the Peabody Museum*, volume 3, pages 276-288, 1887. The Dakota are the group of Plains Indian tribes often called Sioux.

Membership in these societies is not confined to any particular gens or grouping of gentes, but depends upon supernatural indications over which the individual has no control. The animal which appears to a man in a vision during his religious fasting determines to which society he must belong.

The maturity of the sexes is a period of serious and religious experiences which are preparatory by their character for the entrance of the youth or maiden into the religious and secular responsibilities of life, both individual and tribal. Among the tribes which hold especial public ceremonies announcing the maturity of a girl, these rites are held not far from the actual time of puberty, and indicate the close of childhood and entrance of the person into the social status of womanhood. The public festival has, however, been preceded by private religious rites. With young men, the religious training precedes and follows puberty, and the entrance upon manhood is publicly announced by the youth joining in the dangers and duties of tribal life. According to the old customs, a young man did not take a wife until he had proved his prowess, and thus become enrolled among the manly element, or braves as they are sometimes spoken of. The initial fasts of warriors have been mistaken sometimes for ceremonials of puberty.

Among pious families the male children are taught by their parents to look forward to the seeking of personal religious experiences in visions, and the boys are encouraged to go forth as early as the eleventh year of their age. The father makes a small bow and arrows and presents them to his son; these are for protection during the lonely vigil and are not to be used to secure food. With prayerful hearts the parents smear the boy's head and face with moistened earth, in token of humility, and the child is dismissed to seek a secluded spot where he is to remain, calling upon the god by using the ritual chant of the petition for such occasions, until the vision appears, or exhaustion drives him home. Visions are sometimes difficult to secure, many tests being needful, and I have learned of a few Indians who never could obtain one. These fastings are repeated after the vision has been seen, as they belong to the religious rites proper to youth. They are believed to be strengthening to the man, by laying up a store of experiences which are drawn upon for succor in the day of battle, or of trouble. At such times, or when on missions of importance, the man recalls his vision and sings its songs thus appealing to his god. After the youth has entered the roll of manhood, he seldom seeks through fasting a return of the vision, except in cases of unusual anxiety or responsibility when supernatural aid is thus invoked. Only men, known as holy-men, continue in later life these religious exercises of their youth.

No coercion is brought directly to bear upon a lad to perform these rites, but should he unduly defer their performance he would be apt to lose social caste. Boys frequently go off of their own accord for the first experience, and always voluntarily, except when as children their parents suggest the act.

When a youth has made up his mind to submit himself to the ordeal of facing the supernatural and receiving the sign which will be sacred to him all

his life, he takes his bow and arrows and quietly withdraws from his father's lodge, retiring to a lonely place distant from the camp. No one accosts him or notices his departure, no one gives him counsel or direction, entirely alone he goes out to meet through physical privation the form which will be to him a sort of patron saint, or mediator. He seats himself upon the ground, puts moistened earth upon his head and face, draws his robe about him, and awaits the coming of the vision, chanting continuously . . . : "O, mysterious one (or God) have compassion, for I am poor indeed."

It is difficult for one of our own race to enter fully into the mental condition of an Indian youth so placed; one may easily fancy too much, and on the other hand err by accepting too little. The simplicity of Indian life as compared with the complexity of our own is markedly contrasted by these peculiarities. From our birth we are hedged about with questions of law, cause and effect, philosophies, coördinated obligations, all of which force us from too tense a subjectivity, while in Indian life there is little either social or religious adverse to natural instincts, and therefore as this youth sits there, with the tide of life setting in strongly upon him, his thoughts, if one may properly call them such, become blended with the silence and objects about him. All night he must face the chance of hearing ghosts whistle and cry, but these sounds will only tend to make him sink deeper into fancies of natural things, of the animals which furnish food and the chase, of the birds which soar high and escape harm, for these sounds he hears come from uneasy souls who in their earthly life failed to practice carefully the rites of their religious society. If in the midst of his chant he falls asleep, he wakes to another day of watching and fasting. Two, three, four, and even five days may pass while the youth waits for the mental picture to come to him with such vividness and strength, as to bring him the inward conviction that it is indeed a vision. When at last the vision comes, it is the one thing that the Indian holds as his own, incapable of loss. He never in all his life tells it to any one in its minutest details. The most that others may know of it is, when he acts it out on entering the society named for the animal he has seen, or, when on going out to battle or being embarked on some important enterprise, he recalls the vision and sings its song. There is occasionally an Indian who keeps so close counsel that he will not even join the society, and treasures secretly the sign of the animal in the personal bag, a sort of amulet which each one possesses.

When the ordeal is over, the youth weakened and exhausted returns to his father's lodge, partakes of food and rests. No one asks him of his days of absence, no one even mentions the fact that he has been gone. Four days he speaks little. After that period he may, if he choose, select an old and worthy man, who is known to have seen in a vision the same kind of animal, and after eating and smoking with the man, when they are quite alone the youth may tell that he has had a vision of an elk or hawk or whatever animal he saw in his vision. Should he seek to tell this before the appointed time, four days, had elapsed, his vision would be the same as lost to him. After he has spoken to

the old man belonging to the proper society, it becomes the duty of the youth to travel until he shall meet the animal he saw, when he must slay it, and preserve either the whole or a portion. This trophy becomes the visible sign of his vision, and is the most sacred thing he can ever possess. He may wear it upon his scalp lock or on his person during sacred festivals, when going to war, or at other important times.

If the youth determines to join the society named from the animal of his vision, he will have to wait until he shall have accumulated sufficient property to meet the demands of the occasion. It will be needful for him to provide a feast and to give away ponies, blankets or robes and ornamented articles; these latter are contributed by his wife or female relatives.

In 1882 I witnessed the acting out of a vision of an elk by an Ogallala Indian. The man was apparently about 22 or 23 years old and was very much in earnest. The day was bright and balmy, with here and there a patch of light clouds to break the deep blue of the sky. Early in the morning the members of the elk society gathered at the invitation of the neophyte. A new tent had been expressly prepared and was set up to the west of the camp, on an open space quite apart from the village. The door of the tent faced the east. The duty of setting the tent belongs to the women who are members of the society. Around the top part of the tent were painted four blue bands; across the entrance an elk was drawn in red in such a manner that whoever entered the lodge passed through the body of the animal.

The interior of the tent was prepared, as represented in the following diagram, by the elk members, among whom were a few who were leaders and performed especial acts. A pole which had been cut by a relative of the young man (and for the honor of doing this act valuable articles had been given away by him) was brought and the youth hung upon it offerings of calico and tied on a few reeds, each one having fastened to it small knot-like bunches of tobacco rolled in cloth. The pole (fig. 1, *a*) was set up in the tent about five feet back, in line with the door. A few feet behind the centre of the tent an oval (fig. 1, *b*) was cleared of sods and the earth made mellow or fine; in the midst of this, "*u-ma-ne*," as the Dakotas name it, the symbol for the four winds and the earth (fig. 1, *c*) was hollowed out and a coal dropped in the centre of the figure over which sweet grass was laid to smoulder. Over the place in the tent usually occupied by the fire, sprays of *Artemisia ludoviciana* were spread like a mat (fig. 1, *d*) upon which was placed a square looking-glass (fig. 1, *e*) on which lines made of fine dark earth extended from corner to corner, making a cross. Between this and the pole was set the sacred dish containing water (fig. 1, *f*) and a few leaves having a medicinal property. Two pipes (fig. 1, *g*) were passed through the smoke, then lit and ceremoniously used and laid beside the "*u-ma-ne*," the stems toward the east, and offerings of food (fig. 1, *h*) put near the bowls. Four young women (fig. 1, *i*) dressed in green were seated on the right a little within the entrance. They were to assist in singing and carrying the pipes in the long out-door dance.

The acts of preparation, including the painting and masking of the male members, were accompanied by the ritual songs.

In visions there are four colors which appear. One of these the youth must see, and afterward paint himself with the color when performing the rites con-

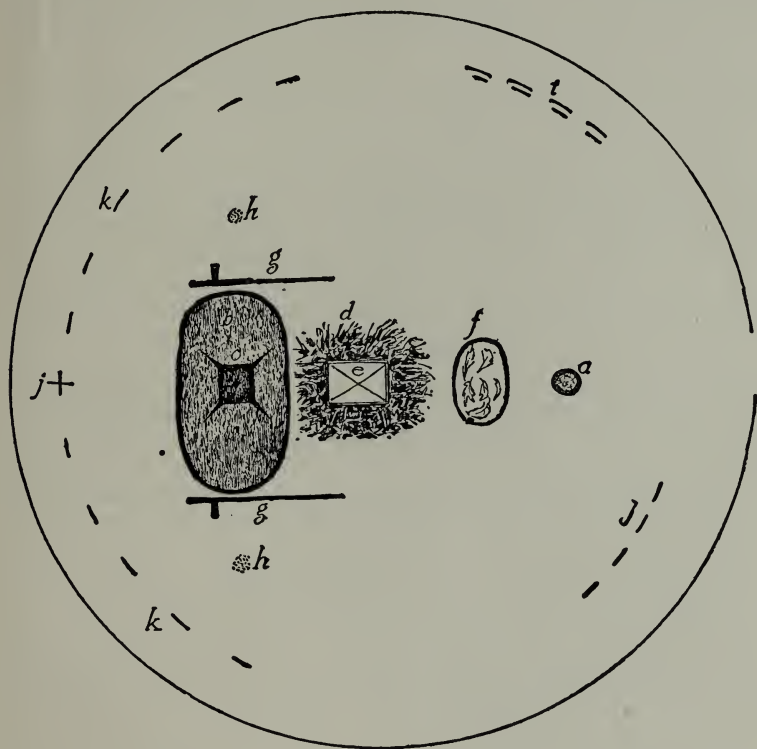


Fig. 1. Arrangement within the tent in the Elk Mystery.

nected with his vision. The four colors are spoken of as, "the white cloud," "the red cloud," "the blue cloud," "the yellow cloud." On the occasion when I was present, the young man who was acting out his vision had seen the "yellow cloud" and his body was therefore painted yellow. He (fig. 1, *j*), and all the other men members of the Elk Society (fig. 1, *k*) seated on either side of him were naked, except a close breech cloth, and decorated according to the colors seen in their respective visions. They wore masks resembling the heads of elk. These masks were made by bending willow branches so as to

form a framework, with a straight bar across the top of the head, two side pieces passing down by the ears and fastened to withes which circled both forehead and neck. Antlers, resembling those of the elk, were ingeniously shaped from boughs and covered with rolled bands of cloth; these were fastened to the side pieces. Over the frame a thin cloth was stretched, having holes to let the antlers through and enclosing the head of the man like a bag. The cloth masks were variously painted and decorated. One had a small circular looking glass like a single eye fastened on the forehead, others had two glasses in place of eyes; nearly all had something fastened on them which would catch and reflect the light.

When the members were masked and painted they presented a strangely grotesque appearance, but there was nothing ludicrous. Upon the back of one man a circle was drawn in blue paint, in the centre of which a splinter of wood was passed through a stitch of cuticle: from the wood dangled an eagle feather fastened by winding a loop of sinew like the figure 8 about the splinter. This I was told represented a special prayer that any wounds the man might receive should not bring death. Friends and spectators were seated just within the entrance, on the left (fig. 1, l).

The morning was consumed with these ceremonies. About 2 P.M. the pipes were handed to two of the young women, and they and the other two passed out of the tent and began walking slowly up the valley toward the north, the two with the pipes preceding and holding the stem forward and upward.

The women had not gone far when the men one by one emerged from the tent, each one taking attitudes indicating caution, as the elk might step forth from cover and look about him. In this manner imitating the elk, the men followed at a distance the girls who were carrying the pipes. Sometimes the elks would leap, crouch, trample the dirt, or glide noiselessly along. Two or three of the men carried a hoop in their hands, one hoop containing a square from which depended a fringe of rattling deer hoofs. The neophyte held one having a circular mirror, fastened by four cords from which he cast a reflection of the sun from time to time upon the ground, or held up the hoop and flashed the mirror.

This singular company made their way slowly, often doubling on their tracks until they had gone three or four miles up the valley, following in a general way a prettily wooded creek. The girls were always in the advance, their black hair and long braids shining in the sun. I did not once see them turn to look at the dancers who were following with wild, yet not unseemly antics.

As the dancers passed on, the men, women and children from the village flocked after the "elks," but never approached within fifty feet of them. The silence and intentness of the actors and spectators added a seemingly incongruous element which arrested the attention of the looker-on, and brought the conviction that the spectacle was not in sport but of a serious character.

The ground passed over in going and returning, taken in a direct line, could not have been far from six or seven miles, though this represents but a small part of the distance travelled. Over four hours were passed in this tortuous dance, if it can be so called. As the company neared the tent from which they had started, a venerable Indian drew my attention to the east, and there I saw pencilled against the sky a portion of a rainbow. Every one was soon looking at the favoring sign and all faces were bright at the promised blessing. While I expressed my sympathy with the people, I could not help glancing about to find the signs of rain, for there had been none all day, and now the buttes were golden in the setting sun, and the fleecy clouds which floated here and there were pearly and light. Without stopping to think, it was easy to share the popular feeling that it was a miraculous indication as an Indian friend said to me: "That rainbow has come directly from the god to show that our friend has faithfully acted his vision, and that his vision was true and his prayers accepted. Our friend has done right! The god has seen it and has told us so!"

When the girls reached the tent the pipes were returned to their places beside the "*u-ma-ne*." The elk members entered one at a time and resumed their former places. Last of all the youth passed in, acting to the end as an elk retiring to a place of quiet safety. The man took his seat in the middle of the group of his associates. After a silence all the men unmasked and gathered their blankets about their dripping bodies. Friends looked in, and in the course of half an hour the company moved off to enjoy the well-earned feast. The tent was soon lowered, and night closing over the scene left it in the past.

50. MAGIC FORMULAS OF THE HUPA INDIANS¹

By P. E. GODDARD

More powerful than any herb were the words recited over it before its use. These words are not prayers but accounts of a former cure. The repeating of the words has power to cure again. It is not necessary for the unclean person to go to the ends of the world that he may become pure. It is sufficient that the priest tell how one went. The spirit of the person follows the words of the priest which he does not even comprehend. Equally powerful are evil wishes. To curse a man was a serious offence, because the words themselves had power to harm. . . .

These formulas may be thought to exert their power in one or all of three ways. The spirit of the recitor may be viewed as undergoing the journey and hardships undergone by the originator of the medicine and in a vicarious manner meriting favor; the good-will of the originator of the medicine may be aroused by the recital of his deeds; or the very words themselves may be thought to have the power of self-fulfillment. . . .

FORMULA OF MEDICINE FOR CHILDBIRTH

He came to the middle of the world where two maidens were living. He smoked himself all day. When the sun went down they came out to look at him. The next day they were pregnant. Their brothers went into the sweat-house after him. They were going to cut the girls open and then kill him. "Wait," said Yimantūwīñyai, "I will make medicine. Give me a cup." "Make the medicine right here," they said. Right there in the house he made it of ashes. Then he hung up the straps of the carrying baskets. He put some of the medicine in the mouth of one of them and rubbed some of it across her abdomen. When he turned around he heard a baby cry. When he had done the same to the other he turned again and heard another baby cry. "This way it will be with those who know my medicine." . . .

¹From pages 88, 93, 279, 315-316, 318 of P. E. Goddard, "Life and Culture of the Hupa" and "Hupa Texts," *University of California Publications in American Archaeology and Ethnology*, volume 1, 1903, 1904. The Hupa live in northwestern California.

FORMULA OF MEDICINE FOR GOING IN DANGEROUS PLACES WITH A CANOE

Snipe lived across to the south. His canoe was very narrow. It was so shallow it did not come above his ankle. I am going in it," he thought. "How is it going to be?" he thought. He took the paddles out of the house and went down to the river. He got into his canoe and then he got out again. He turned the canoe around. He placed it with the stern toward the land. "Indians are going to come into existence," he thought. "They will think about me with this." He held it with the stern toward the land, headed this way across the river and down stream. "There must not be many," he thought, "who will say of me, 'That one I hear did this way.'" Then he went into the canoe, beat on the stern with the paddle, and sang. When he started across, his canoe grew up higher, and floated with him over the world. The boat did not mind the water. It floated with him over this body of water which lies around the world. He sang a song as he went along. It floated back with him across to the south. "It will do that way with the man who knows my medicine," he thought. "Even if he goes into a bad place, if he thinks about me, this way the water will not trouble his boat." . . .

FORMULA OF MEDICINE FOR GOING AMONG RATTLESNAKES

While at Tcexoltewediñ Yimantūwiñyaɪ felt dissatisfied with something. "How will the people live?" he thought. He started out and walked up along the Klamath. When the sun went down, rattlesnakes which had wings flew about. He looked about as he went along and thought, "What kind of medicine shall I make?" He saw a bush of *Philadelphus* standing there. He broke off a shoot, made rings around it, and used it for a cane. "When I come to Lōknasaūndiñ, that lies ahead of me," he thought, "I will whip the air with it." When he came out into the prairie at Lōknasaūndiñ he whipped about himself with the cane. He found nothing there. He had killed them all immediately. "This is the way it will happen," he thought, "if any one takes my cane along. He will go through dangerous places if he carries my cane, and he will not see rattlesnakes."

51. THE CREATION ACCORDING TO THE MAORI OF NEW ZEALAND¹

By SIR GEORGE GREY

Men had but one pair of primitive ancestors; they sprang from the vast heaven that exists above us, and from the earth which lies beneath us. According to the traditions of our race, Rangi, and Papa, or Heaven and Earth, were the source from which in the beginning, all things originated. Darkness then rested upon the heaven and upon the earth, and they still both clave together, for they had not yet been rent apart; and the children they had begotten were ever thinking amongst themselves what might be the difference between darkness and light; they knew that beings had multiplied and increased, and yet light had never broken upon them, but it ever continued dark. Hence these sayings are found in our ancient religious services: "There was darkness from the first division of time, unto the tenth, to the hundredth, to the thousandth," that is, for a vast space of time; and these divisions of time were as beings, and were each termed a Po; and on their account there was as yet no world with its bright light, but darkness only for the beings which existed.

At last the beings who had been begotten by Heaven and Earth, worn out by the continued darkness, consulted amongst themselves, saying: "Let us now determine what we should do with Rangi and Papa, whether it would be better to slay them or to rend them apart." Then spoke Tumatauenga, the fiercest of the children of Heaven and Earth: "It is well, let us slay them."

Then spake Tane-mahuta, the father of forests and of all things that inhabit them, or that are constructed from trees: "Nay, not so. It is better to rend them apart, and to let the heaven stand far above us, and the earth lie under our feet. Let the sky become as a stranger to us, but the earth remain close to us as our nursing mother."

The brothers all consented to this proposal, with the exception of Tawhiri-ma-tea, the father of winds and storms, and he, fearing that his kingdom was about to be overthrown, grieved greatly at the thought of his parents being torn apart. Five of the brothers willingly consented to the separation of their parents, but one of them would not agree to it.

Hence, also, these sayings of old are found in our prayers: "Darkness, darkness, light, light, the seeking, the searching, in chaos, in chaos"; these signified the way in which the offspring of heaven and earth sought for some mode of dealing with their parents, so that human beings might increase and live.

¹Reprinted from Sir George Grey, *Polynesian Mythology* (London, 1855), pages 1-41.

So, also, these sayings of old time, "The multitude, the length," signified the multitude of the thoughts of the children of Heaven and Earth, and the length of time they considered whether they should slay their parents, that human beings might be called into existence; for it was in this manner that they talked and consulted amongst themselves.

But at length, their plans having been agreed on, Io, Rongo-ma-tane, the god and father of the cultivated food of man, rises up, that he may rend apart the heavens and the earth; he struggles, but he rends them not apart. Lo, next, Tangaroa, the god and father of fish and reptiles, rises up, that he may rend apart the heavens and the earth; he also struggles, but he rends them not apart. Lo, next, Haumia-tikitiki, the god and father of the food of man which springs without cultivation, rises up and struggles, but ineffectually. Io, then, Tu-matauenga, the god and father of fierce human beings, rises up and struggles, but he, too, fails in his efforts. Then at last, slowly uprises Tane-mahuta, the god and father of forests, of birds, and of insects, and he struggles with his parents; in vain he strives to rend them apart with his hands and arms. Lo, he pauses: his head is now firmly planted on his mother the earth, his feet he raises up and rests against his father the skies, he strains his back and limbs with mighty effort. Now are rent apart Rangi and Papa, and with cries and groans of woe they shriek aloud: "Wherefore slay you thus your parents? Why commit you so dreadful a crime as to slay us, as to rend your parents apart?" But Tane-mahuta pauses not, he regards not their shrieks and cries; far, far beneath him he presses down the earth; far, far above him he thrusts up the sky.

Hence these sayings of olden times: "It was the fierce thrusting of Tane which tore the heaven from the earth, so that they were rent apart, and darkness was made manifest, and so was the light."

No sooner was heaven rent from earth than the multitude of human beings were discovered whom they had begotten, and who had hitherto lain concealed between the bodies of Rangi and Papa.

Then, also, there arose in the breast of Tawhiri-ma-tea, the god and father of winds and storms, a fierce desire to wage war with his brothers, because they had rent apart their common parents. He from the first had refused to consent to his mother being torn from her lord and children; it was his brothers alone that wished for this separation, and desired that Papa-tu-a-nuku, or the Earth alone, should be left as a parent for them.

The god of hurricanes and storms dreads also that the world should become too fair and beautiful, so he rises, follows his father to the realm above, and hurries to the sheltered hollows in the boundless skies; there he hides and clings, and nestling in this place of rest he consults long with his parent, and as the vast Heaven listens to the suggestions of Tawhiri-ma-tea, thoughts and plans are formed in his breast, and Tawhiri-ma-tea also understands what he should do. Then by himself and the vast Heaven were begotten his numerous brood, and they rapidly increased and grew. Tawhiri-ma-tea despatches

one of them to the westward, and one to the southward, and one to the eastward, and one to the northward; and he gives corresponding names to himself and to his progeny, the mighty winds.

He next sends forth fierce squalls, whirlwinds, dense clouds, massy clouds, dark clouds, gloomy thick clouds, fiery clouds, clouds which precede hurricanes, clouds of fiery black, clouds reflecting glowing red light, clouds wildly drifting from all quarters and wildly bursting, clouds of thunder storms, and clouds hurriedly flying. In the midst of these Tawhiri-ma-tea himself sweeps wildly on. Alas! Alas! then rages the fierce hurricane; and whilst Tane-mahuta and his gigantic forests still stand, unconscious and unsuspecting, the last of the breath of the mouth of Tawhiri-ma-tea smites them, the gigantic trees are snapt off right in the middle; alas! alas! they are rent to atoms, dashed to the earth, with boughs and branches torn and scattered, and lying on the earth, trees and branches all alike left for the insect, for the grub, and for loathsome rottenness.

From the forests and their inhabitants Tawhiri-ma-tea next swoops down upon the seas, and lashes in his wrath the ocean. Ah! ah! waves steep as cliffs arise, whose summits are so lofty that to look from them would make the beholder giddy; these soon eddy in whirlpools, and Tangaroa, the god of ocean, and father of all that dwell therein, flies affrighted through his seas; but before he fled, his children consulted together how they might secure their safety, for Tangaroa had begotten Punga, and he had begotten two children, Ika-tere, the father of fish, and Tu-te-wehiwehi, or Tu-te-wanawana, the father of reptiles.

When Tangaroa fled for safety to the ocean, then Tu-te-wehiwehi and Ika-tere, and their children, disputed together as to what they should do to escape from the storms, and Tu-te-wehiwehi and his party cried aloud: "Let us fly inland;" but Ika-tree and his party cried aloud: "Let us fly to the sea." Some would not obey one order, some would not obey the other, and they escaped in two parties: the party of Tu-te-wehiwehi, or the reptiles, hid themselves ashore; the party of Punga rushed to the sea. This is what, in our ancient religious services, is called the separation of Tawhiri-ma-tea.

Hence these traditions have been handed down: "Ika-tere, the father of things which inhabit water, cried aloud to Tu-te-wehiwehi: 'Ho, ho, let us all escape to the sea.'"

"But Tu-te-wehiwehi shouted in answer: 'Nay, nay, let us rather fly inland.'"

"Then Ika-tere warned him, saying: 'Fly inland, then; and the fate of you and your race will be, that when they catch you, before you are cooked, they will singe off your scales over a lighted wisp of dry fern.'"

"But Tu-te-wehiwehi answered him, saying: 'Seek safety, then, in the sea; and the future fate of your race will be, that when they serve out little baskets of cooked vegetable food to each person, you will be laid upon the top of the food to give a relish to it.'"

"Then without delay these two races of beings separated. The fish fled in confusion to the sea, the reptiles sought safety in the forests and shrubs."

Tangaroa, enraged at some of his children deserting him, and, being sheltered by the god of the forests on dry land, has ever since waged war on his brother Tane, who, in return, has waged war against him.

Hence Tane supplies the offspring of his brother To-matauenga with canoes, with spears and with fish-hooks made from his trees, and with nets woven from his fibrous plants, that they may destroy the offspring of Tangaroa; whilst Tangaroa, in return, swallows up the offspring of Tane, overwhelming canoes with the surges of his sea, swallowing up the lands, trees, and houses that are swept off by floods, and ever wastes away, with his lapping waves, the shores that confine him, that the giants of the forests may be washed down and swept out into his boundless ocean, that he may then swallow up the insects, the young birds, and the various animals which inhabit them—all which things are recorded in the prayers which were offered to these gods.

Tawhiri-ma-tea next rushed on to attack his brothers Rongo-ma-tane and Haumia-tikitiki, the gods and progenitors of cultivated and uncultivated food; but Papa, to save these for her other children, caught them up, and hid them in a place of safety; and so well were these children of hers concealed by their mother Earth that Tawhiri-ma-tea sought for them in vain.

Tawhiri-ma-tea, having thus vanquished all his other brothers, next rushed against Tu-matauenga, to try his strength against his; he exerted all his force against him, but he could neither shake him or prevail against him. What did Tu-matauenga care for his brother's wrath? He was the only one of the whole party of brothers who had planned the destruction of their parents, and had shown himself brave and fierce in war; his brothers had yielded at once before the tremendous assaults of Tawhiri-ma-tea and his progeny—Tane-mahuta and his offspring had been broken and torn in pieces—Tangaroa and his children had fled to the depths of the ocean or the recesses of the shore—Rongo-ma-tane and Haumia-tikitiki had been hidden from him in the earth—but Tu-matauenga, or man, still stood erect and unshaken upon the breast of his mother Earth; and now at length the hearts of Heaven and of the god of storms became tranquil, and their passions were assuaged.

Tu-matauenga, or fierce man, having thus successfully resisted his brother, the god of hurricanes and storms, next took thought how he could turn upon his brothers and slay them, because they had not assisted him or fought bravely when Tawhiri-ma-tea had attacked them to avenge the separation of their parents, and because they had left him alone to show his prowess in the fight. As yet death had no power over man. It was not until the birth of the children of Taranga and of Makea-tu-tara, of Maui-taha, of Maui-roto, of Maui-pae, of Maui-waho, and of Maui-tikitiki-o-Taranga, the demi-god who tried to drain Hine-nui-te-po, that death had power over men. If that goddess had not been deceived by Maui-tikitiki, men would not have died, but would in that case have lived forever; it was from his deceiving Hine-nui-te-po

that death obtained power over mankind, and penetrated to every part of the earth.

Tu-matauenga continued to reflect upon the cowardly manner in which his brothers had acted, in leaving him to show his courage alone, and he first sought some means of injuring Tane-mahuta, because he had not come to aid him in his combat with Tawhiri-ma-tea, and partly because he was aware that Tane had had a numerous progeny, who were rapidly increasing, and might at last prove hostile to him, and injure him, so he began to collect leaves of the whanake tree, and twisted them into nooses, and when his work was ended, he went to the forest to put up his snares, and hung them up—ha! ha! the children of Tane fell before him; none of them could any longer fly or move in safety.

Then he next determined to take revenge on his brother Tangaroa, who had also deserted him in the combat; so he sought for his offspring, and found them leaping or swimming in the water; then he cut many leaves from the flax-plant, and netted nets with the flax, and dragged these, and hauled the children of Tangaroa ashore.

After that, he determined also to be revenged upon his brothers Rongo-ma-tane and Haumia-tikitiki; he soon found them by their peculiar leaves, and he scraped into shape a wooden hoe, and plaited a basket, and dug in the earth and pulled up all kinds of plants with edible roots, and the plants which had been dug up withered in the sun.

Thus Tu-matauenga devoured all his brothers, and consumed the whole of them, in revenge for their having deserted him and left him to fight alone against Tawhiri-ma-tea and Rangi.

When his brothers had all thus been overcome by Tu, he assumed several names, namely, Tu-ka-riri, Tu-ka-nguha, Tu-ka-taua, Tu-whaka-heke-tangata, Tu-mata-wha-iti, and Tu-matauenga; he assumed one name for each of his attributes displayed in the victories over his brothers. Four of his brothers were entirely deposed by him, and became his food; but one of them, Tawhiri-ma-tea, he could not vanquish or make common by eating him for food, so he, the last-born child of Heaven and Earth, was left as an enemy for man, and still, with a rage equal to that of Man, this elder brother ever attacks him in storms and hurricanes, endeavoring to destroy him alike by sea and land.

Now, the meanings of these names of the children of the Heaven and Earth are as follows:

Tangaroa signifies fish of every kind; Rongo-ma-tane signifies the sweet potato, and all vegetables cultivated as food; Haumia-tikitiki signifies fern root, and all kinds of food which grow wild; Tane-mahuta signifies forests, the birds and insects which inhabit them, and all things fashioned from wood; Tawhiri-ma-tea signifies winds and storms; and Tu-matauenga signifies man.

Four of his brothers having, as before stated, been made common, or articles of food by Tu-matauenga, he assigned for each of them fitting incantations, that they might be abundant, and that he might easily obtain them.

Some incantations were proper to Tane-mahuta; they were called Tane.
Some incantations were for Tangaroa; they were called Tangaroa.
Some were for Rongo-ma-tane; they were called Rongo-ma-tane.
Some were for Haumia-tikitiki; they were called Haumia.

The reason that he sought out these incantations was, that his brothers might be made common by him, and serve for his food. There were also incantations for Tawhiri-ma-tea to cause favorable winds, and prayers to the vast Heaven for fair weather, as also for mother Earth, that she might produce all things abundantly. But it was the great God that taught these prayers to man.

There were also many prayers and incantations composed for man, suited to the different times and circumstances of his life—prayers at the baptism of an infant; prayers for abundance of food, for wealth; prayers in illness; prayers to spirits, and for many other things.

The bursting forth of the wrathful fury of Ta-whiri-ma-tea against his brothers was the cause of the disappearance of a great part of the dry land; during that contest a great part of mother Earth was submerged. The names of those beings of ancient days who submerged so large a portion of the earth were Terrible-rain, Long-continued-rain, Fierce-hail-storms; and their progeny were Mist, Heavy-dew, and Light-dew, and these together submerged the greater part of the earth, so that only a small portion of dry land projected above the sea.

From that time clear light increased upon the earth, and all the beings which were hidden between Rangi and Papa before they were separated, now multiplied upon the earth. The first beings begotten by Rangi and Papa were not like human beings; but Tu-matauenga bore the likeness of a man, as did all his brothers, as also did a Po, a Ao, a Kore, to Kimihanga and Runku, and thus it continued until the times of Ngainui and his generation, and of Whiro-te-tupu and his generation, and it has so continued to this day.

The children of Tu-matauenga were begotten on this earth, and they increased, and continued to multiply, until we reach at last the generation of Maui-taha, and of his brothers Maui-roto, Maui-waho, Maui-pae, and Maui-tikitiki-o-Taranga.

Up to this time the vast Heaven has still ever remained separated from his spouse the Earth. Yet their mutual love still continues—the soft, warm sighs of her loving bosom still ever rise up to him, ascending from the woody mountains and valleys, and men call these mists; and the vast Heaven, as he mourns through the long nights his separation from his beloved, drops frequent tears upon her bosom, and men seeing these, term them dew-drops.

THE LEGEND OF MAUI

The young hero, Maui, had not been long at home with his brothers when he began to think that it was too soon after the rising of the sun that it became night again, and that the sun again sank down below the horizon, every day, every day; in the same manner the days appeared too short to him. So at last, one day he said to his brothers: "Let us now catch the sun in a noose, so that we may compel him to move more slowly, in order that mankind may have long days to labor in to produce subsistence for themselves;" but they answered him: "Why, no man could approach it on account of its warmth, and the fierceness of its heat;" but the young hero said to them: "Have you not seen the multitude of things I have already achieved? Did you not see me change myself into the likeness of every bird of the forest? You and I equally had the aspect and appearance of men, yet I by my enchantments changed suddenly from the appearance of man and became a bird, and then, continuing to change my form, I resembled this bird or that bird, one after the other, until I had by degrees transformed myself into every bird in the world, small or great; and did I not after all this again assume the form of a man? [This he did soon after he was born, and it was after that he snared the sun.] Therefore, as for that feat, O my brothers, the changing myself into birds, I accomplished it by enchantments, and I will by the same means accomplish also this other thing which I have in my mind." When his brothers heard this, they consented on his persuasions to aid him in the conquest of the sun.

Then they began to spin and twist ropes to form a noose to catch the sun in, and in doing this they discovered the mode of plaiting flax into stout square-shaped ropes (*tuamaka*), and the manner of plaiting flat ropes (*paharahara*), and of spinning round ropes; at last, they finished making all the ropes which they required. Then Maui took up his enchanted weapon, and he took his brothers with him, and they carried their provisions, ropes, and other things with them, in their hands. They travelled all night, and as soon as day broke, they halted in the desert, and hid themselves that they might not be seen by the sun; and at night they renewed their journey, and before dawn they halted, and hid themselves again; at length they got very far, very far, to the eastward, and came to the very edge of the place out of which the sun rises.

Then they set to work and built on each side of this place a long, high wall of clay, with huts of boughs of trees at each end to hide themselves in; when these were finished, they made the loops of the noose, and the brothers of Maui then lay in wait on one side of the place out of which the sun rises, and Maui himself lay in wait upon the other side.

The young hero held in his hand his enchanted weapon, the jawbone of his ancestress—of Muri-ranga-whenua—and said to his brothers: "Mind now, keep yourselves hid, and do not go showing yourselves foolishly to the sun; if you do, you will frighten him; but wait patiently until his head and fore

legs have got well into the snare, then I will shout out, haul away as hard as you can on the ropes on both sides, and then I'll rush out and attack him, but do you keep your ropes tight for a good long time (while I attack him), until he is nearly dead, when we will let him go; but mind, now, my brothers, do not let him move you to pity with his shrieks and screams."

At last the sun came rising up out of his place, like a fire spreading far and wide over the mountains and forests, he rises up, his head passes through the noose, and it takes in more and more of his body, until his forepaws pass through; then are pulled tight the ropes, and the monster began to struggle and roll himself about, whilst the snare jerked backwards and forwards as he struggled. Ah! was not he held fast in the ropes of his enemies!

Then forth rushed that bold hero, Maui-tikitiki-o-Taranga, with his enchanted weapon. Alas! the sun screams aloud; he roars; Maui strikes him fiercely with many blows; they hold him for a long time. At last they let him go, and then, weak from wounds, the sun crept slowly along its course. Then was learnt by men the second name of the sun, for in its agony the sun screamed out: "Why am I thus smitten by you! O man! do you know what you are doing? Why should you wish to kill Tamanui-te-Ra?" Thus was learnt his second name. At last they let him go. Oh, then, Tama-nui-te-Ra went very slowly and feebly on his course.

Maui-taha and his brothers after this feat returned again to their own house, and dwelt there, and dwelt there, and dwelt there; and after a long time his brothers went out fishing, whilst Maui-tikitiki-o-Taranga stopped idly at home doing nothing, although indeed he had to listen to the sulky grumblings of his wives and children, at his laziness in not catching fish for them. Then he called out to the women, "Never mind, O mothers, yourselves and your children need not fear. Have not I accomplished all things, and as for this little feat, this trifling work of getting food for you, do you think I cannot do that? Certainly; if I go and get a fish for you, it will be one so large that when I bring it to land you will not be able to eat it all, and the sun will shine on it and make it putrid before it is consumed." Then Maui snooded his enchanted fish-hook, which was pointed with part of the jaw-bone of Muri-ranga-whenua, and when he had finished this, he twisted a stout fishing-line to his hook.

His brothers in the meantime had arranged amongst themselves to make fast the lashings of the top side of their canoe, in order to go out for a good day's fishing. When all was made ready they launched their canoe, and as soon as it was afloat Maui jumped into it, and his brothers, who were afraid of his enchantments, cried out: "Come get out again, we will not let you go with us; your magical arts will get us into some difficulty." So he was compelled to remain ashore whilst his brothers paddled off, and when they reached the fishing ground they lay upon their paddles and fished, and after a good day's sport returned shore.

As soon as it was dark night Maui went down to the shore, got into his brothers' canoe, and hid himself under the bottom boards of it. The next

forenoon his brothers came down to the shore to go fishing again, and they had their canoe launched, and paddled out to sea without ever seeing Maui, who lay hid in the hollow of the canoe under the bottom boards. When they got well out to sea Maui crept out of his hiding place; as soon as his brothers saw him, they said: "We had better get back to the shore again as fast as we can, since this fellow is on board;" but Maui, by his enchantments, stretched out the sea so that the shore instantly became very distant from them, and by the time they could turn themselves around to look for it, it was out of view. Maui now said to them: "You had better let me go on with you, I shall at least be useful to bail the water out of our canoe." To this they consented, and they paddled on again and speedily arrived at the fishing ground where they used to fish upon former occasions. As soon as they got there his brothers said: "Let us drop the anchor and fish here;" and he answered: "Oh, no, don't; we had much better paddle a long distance farther out." Upon this they paddle on, and paddle as far as the farthest fishing ground, a long way out to sea, and then his brothers at last say: "Come now, we must drop anchor and fish here." And he replies again, "Oh, the fish here are very fine, I suppose, but we had much better pull right out to sea, and drop anchor there. If we go out to the place where I wish the anchor to be let go, before you can get a hook to the bottom, a fish will come following it back to the top of the water. You won't have to stop there a longer time than you can wink your eye in, and our canoe will come back to shore full of fish." As soon as they hear this they paddle away—they paddle away until they reach a very long distance off, and his brothers then say: "We are now far enough." And he replies: "No, no, let us go out of sight of land, and when we have quite lost sight of it, then let the anchor be dropped, but let it be very far off, quite out in the open sea."

At last they reach the open sea, and his brothers begin to fish. Lo, lo, they had hardly let their hooks down to the bottom, when they each pulled up a fish into the canoe. Twice only they let down their lines, when behold the canoe was filled up with the number of fish they had caught. Then his brothers said: "Oh, brother, let us all return now." And he answered them: "Stay a little; let me also throw my hook into the sea." And his brothers replied: "Where did you get a hook?" And he answered: "Oh, never mind, I have a hook of my own." And his brothers replied again: "Make haste and throw it, then." And as he pulled it out from under his garments, the light flashed from the beautiful mother-of-pearl shell in the hollow of the hook, and his brothers saw that the hook was carved and ornamented with tufts of hair pulled from the tail of a dog, and it looked exceedingly beautiful. Maui then asked his brothers to give him a little bait to bait his hook with; but they replied: "We will not give you any of our bait." So he doubled his fist and struck his nose violently and the blood gushed out, and he smeared his hook with his own blood for bait, and then he cast it into the sea, and it sank down, and sank down, till it reached to the small carved figure on the roof of a house

at the bottom of the sea, then passing by the figure, it descended along the outside carved rafters of the roof, and fell in at the doorway of the house, and the hook of Maui-tikitiki-o-Taranga caught first in the sill of the doorway.

Then, feeling something on his hook, he began to haul in his line. Ah, ah!—there ascended on his hook the house of that old fellow Tonga-nui. It came up, up; and as it rose high, oh dear! how his hook was strained with its great weight; and then there came gurgling up foam and bubbles from the earth, as of an island emerging from the water, and his brothers opened their mouths and cried aloud.

Maui all this time continued to chant forth incantations amidst the murmurs and wailings of his brothers, who were weeping and lamenting, and saying, "See now, how he has brought us out into the open sea, that we may be upset in it, and devoured by the fish." Then he raised aloud his voice, and repeated the incantation called Hiki which makes heavy weights light, in order that the fish he had caught might come up easily, and he chanted an incantation beginning thus:

"Wherefore, then, O! Tonganui,
Dost thou hold fast so obstinately below there?"

When he had finished his incantation, there floated up, hanging to his line, the fish of Maui, a portion of the earth, of Papa-tu-a-Nuku. Alas! alas! their canoe lay aground.

Maui then left his brothers with their canoe, and returned to the village; but before he went he said to them: "After I am gone, be courageous and patient; do not eat food until I return, and do not let our fish be cut up, but rather leave it until I have carried an offering to the gods from this great haul of fish, and until I have found a priest, that fitting prayers and sacrifices may be offered to the god, and the necessary rites be completed in order. We shall thus all be purified. I will then return, and we can cut up this fish in safety, and it shall be fairly portioned out to this one, and to that one, and to that other; and on my arrival you shall each have your due share of it, and return to your homes joyfully; and what we leave behind us will keep good, and that which we take away with us, returning, will be good too."

Maui had hardly gone, after saying all this to them, than his brothers trampled under their feet the words they had heard him speak. They began at once to eat food, and to cut up the fish. When they did this, Maui had not yet arrived at the sacred place, in the presence of the god; had he previously reached the sacred place the heart of the deity would have been appeased with the offering of a portion of the fish which had been caught by his disciples, and all the male and female deities would have partaken of their portions of the sacrifice. Alas! alas! those foolish, thoughtless brothers of his cut up the fish, and behold the gods turned with wrath upon them, on account of the fish which they had thus cut up without having made a fitting sacrifice. Then indeed, the fish began to toss about his head from side to side, and to

lash his tail, and the fins upon his back, and his lower jaw. Ah! ah! well done Tangaroa, it springs about on shore as briskly as if it was in the water.

That is the reason that this island is now so rough and uneven—that here stands a mountain, and there lies a plain; that here descends a vale, that there rises a cliff. If the brothers of Maui had not acted so deceitfully, the huge fish would have lain flat and smooth, and would have remained as a model for the rest of the earth, for the present generation of men. This, which has just been recounted, is the second evil which took place after the separation of Heaven from Earth.

Thus was dry land fished up by Maui after it had been hidden under the ocean by Rangi and Tawhiri-ma-tea. It was with an enchanted fish-hook that he drew it up, which was pointed with a bit of the jaw-bone of his ancestress Muri-ranga-whenua; and in the district of Heretaunga they still show the fish-hook of Maui, which became a cape stretching far out into the sea, and now forms the southern extremity of Hawke's Bay.

The hero now thought that he would extinguish and destroy the fires of his ancestress of Mahu-ika. So he got up in the night, and put out the fires left in the cooking-houses of each family in the village; then, quite early in the morning, he called aloud to the servants: "I hunger, I hunger; quick, cook some food for me." One of the servants thereupon ran as fast as he could to make up the fire to cook some food, but the fire was out; and as he ran round from house to house in the village to get a light, he found every fire quite out—he could nowhere get a light.

When Maui's mother heard this, she called out to the servants, and said: "Some of you repair to my great ancestress Mahu-ika; tell her that fire has been lost upon earth, and ask her to give some to the world again." But the slaves were alarmed, and refused to obey the commands which their masters, the sacred old people, gave them; and they persisted in refusing to go, notwithstanding the old people repeatedly ordered them to do so.

At last, Maui said to his mother: "Well, then, I will fetch down fire for the world; but which is the path by which I must go?" And his parents, who knew the country well, said to him: "If you will go, follow that broad path that lies just before you there; and you will at last reach the dwelling of an ancestress of yours; and if she asks you who you are, you had better call out your name to her, then she will know you are a descendant of hers; but be cautious, and do not play any tricks with her, because we have heard that your deeds are greater than the deeds of men, and that you are fond of deceiving and injuring others, and perhaps you even now intend in many ways to deceive this old ancestress of yours, but pray be cautious not to do so."

But Maui said: "No, I only want to bring fire away for men, that is all, and I'll return again as soon as I can do that." Then he went, and reached the abode of the goddess of fire; and he was so filled with wonder at what he saw that for a long time he could say nothing. At last he said: "O lady, would you rise up? Where is your fire kept? I have come to beg some from you."

Then the aged lady rose right up, and said: "Au-e! who can this mortal be?" and he answered, "It's I." "Where do you come from?" said she, and he answered, "I belong to this country." "You are not from this country," said she; "your appearance is not like that of the inhabitants of this country. Do you come from the northeast?" He replied, "No." "Do you come from the southeast?" He replied, "No." "Are you from the south?" He replied, "No." "Are you from the westward?" He answered, "No." "Come you, then, from the direction of the wind which blows right upon me?" And he said, "I do." "Oh, then," cried she, "you are my grandchild; what do you want here?" He answered, "I am come to beg fire from you." She replied, "Welcome, welcome; here then is fire for you."

Then the aged woman pulled out her nail; and as she pulled it out fire flowed from it, and she gave it to him. And when Maui saw she had drawn out her nail to produce fire for him, he thought it a most wonderful thing! Then he went a short distance off, and when not very far from her, he put the fire out, quite out; and returning to her again, said: "The light you gave me has gone out, give me another." Then she caught hold of another nail, and pulled it out as a light for him; and he left her, and went a little on one side, and put that light out also; then he went back to her again, and said: "O, lady, give me, I pray you, another light, for the last one has also gone out." And thus he went on and on, until she had pulled out all the nails of the fingers of one of her hands; and then she began with the other hand, until she had pulled all the fingernails out of that hand, too; and then she commenced upon the nails of her feet, and pulled them also out in the same manner, except the nail of one of her big toes. Then the aged woman said to herself at last: "This fellow is surely playing tricks with me."

Then out she pulled the one toe-nail that she had left, and it, too, became fire, and as she dashed it down on the ground the whole place caught fire. And she cried out to Maui; "There, you have it all now!" And Maui ran off, and made a rush to escape, but the fire followed hard after him, close behind him; so he changed himself into a fleet-winged eagle, and flew with rapid flight, but the fire pursued, and almost caught him as he flew. Then the eagle dashed down into a pool of water; but when he got into the water he found that almost boiling too: the forests just then also caught fire, so that it could not alight anywhere, and the earth and sea both caught fire too, and Maui was very near perishing in the flames.

Then he called on his ancestors Tawhiri-ma-tea and Whatitiri-matakataka, to send down an abundant supply of water, and he cried aloud: "Oh, let water be given to me to quench this fire which pursues after me;" and lo, then appeared squalls and gales, and Tawhiri-ma-tea sent heavy lasting rain, and the fire was quenched; and before Mahuika could reach her place of shelter, she almost perished in the rain, and her shrieks and screams became as loud as those of Maui had been, when he was scorched by the pursuing fire: thus Maui ended this proceeding. In this manner was extinguished the fire of

Mahuika, the goddess of fire; but before it was all lost, she saved a few sparks which she threw, to protect them, into the Kaiko-mako, and a few other trees, where they are still cherished; hence, men yet use portions of the wood of these trees for fire when they require a light. . . .

Maui . . . now returned to his parents, and when he had been with them for some time, his father said to him one day: "O, my son, I have heard from your mother and others that you are very valiant, and that you have succeeded in all feats that you have undertaken in your own country, whether they were small or great; but now that you have arrived in your father's country, you will, perhaps, at last be overcome."

Then Maui asked him: "What do you mean? What things are there that I can be vanquished by?" And his father answered him: "By your great ancestress, by Hine-nui-te-po, who, if you look, you may see flashing, and as it were, opening and shutting there, where the horizon meets the sky." And Maui replied: "Lay aside such idle thoughts, and let us both fearlessly seek whether men are to die or live forever." And his father said: "My child, there has been an ill omen for us; when I was baptizing you, I omitted a portion of the fitting prayers, and that I know will be the cause of your perishing."

Then Maui asked his father: "What is my ancestress Hine-nui-te-po like?" And he answered: "What you see yonder shining so brightly red are her eyes, and her teeth are as sharp and hard as pieces of volcanic glass; her body is like that of a man, and as for the pupils of her eyes, they are jasper; and her hair is like tangles of long seaweed; and her mouth is like that of a barracouta." Then his son answered him: "Do you think her strength is as great as that of Tama-nui-te-Ra, who consumes Man, and the earth, and the very waters, by the fierceness of his heat? Was not the world formerly saved alive by the speed with which he travelled? If he had then, in the days of his full strength and power, gone as slowly as he does now, not a remnant of mankind would have been left living upon the earth, nor indeed, would anything else have survived. But I laid hold of Tama-nui-te-Ra, and now he goes slowly, for I smote him again and again, so that he is now feeble, and long in travelling his course, and he now gives but very little heat, having been weakened by the blows of my enchanted weapon; I then, too, split him open in many places, and from the wounds so made, many rays now issue forth, and spread in all directions. So, also, I found the sea much larger than the earth, but by the power of the last-born of your children, part of the earth was drawn up again, and dry land came forth." And his father answered him: "That is all very true, O my last born, and the strength of my old age; well, then, be bold, go and visit your great ancestress who flashes so fiercely there, where the edge of the horizon meets the sky."

Hardly was this conversation concluded with his father, when the young hero went forth to look for companions to accompany him upon this enterprise; and so there came to him for companions, the small robin, and the large robin, and the thrush, and the yellow-hammer, and every kind of little bird,

and the water-wagtail, and these all assembled together, and they all started with Maui in the evening, and arrived at the dwelling of Hine-nui-te-po, and found her fast asleep.

Then Maui addressed them all, and said: "My little friends, now if you see me creep into this old chieftainess, do not laugh at what you see. Nay, nay, do not I pray you, but when I have got altogether inside her, and just as I am coming out of her mouth, then you may shout with laughter if you please." And his little friends, who were frightened at what they saw, replied: "Oh, sir, you will certainly be killed." And he answered them: "If you burst out laughing at me as soon as I get inside her, you will wake her up, and she will certainly kill me at once, but if you do not laugh until I am quite inside her, and am on the point of coming out of her mouth, I shall live, and Hine-nui-te-po will die." And his little friends answered: "Go on then, brave sir, but pray take good care of yourself."

The young hero started off, and twisted the strings of his weapon tight round his wrist, and went into the house, and stripped off his clothes, and the skin on his hips looked mottled and beautiful as that of a mackerel, from the tattoo marks, cut on it with the chisel of Uetonga, and entered the old chieftainess.

The little birds now screwed up their tiny cheeks, trying to suppress their laughter; at last, the little Tiwakawaka could no longer keep it in, and laughed out loud, with its merry, cheerful note; this woke the old woman up, she opened her eyes, started up, and killed Maui.

Thus died this Maui we have spoken of, but before he died he had children, and sons were born to him; some of his descendants yet live in Hawaiki some in Aotearoa (or in these islands); the greater part of his descendants remained in Hawaiki, but a few of them came here to Aotearoa. According to the traditions of the Maori,² this was the cause of the introduction of death into the world (Hine-nui-te-po being the goddess of death: if Maui had passed safely through her, then no more human beings would have died, but death itself would have been destroyed), and we express it by saying: "The water-wagtail laughing at Maui-tikitiki-o-Taranga made Hine-nui-te-po squeeze him to death." And we have this proverb: "Men make heirs, but death carries them off."

Thus end the deeds of the son of Makeatutara and of Tarana, and the deeds of the sons of Rangi-nui, and of Papa-tu-Nuku; this is the narrative about the generations of the ancestors of the inhabitants of New Zealand, and therefore, we the people of that country, preserve closely these traditions of old times, as a thing to be taught to the generations that come after us, so we repeat them in our prayers, and whenever we relate the deeds of the ancestors from whom each family is descended, and upon other similar occasions.

²Inhabitants of New Zealand.

52. THE CREATION ACCORDING TO THE MAIDU INDIANS
OF CALIFORNIA¹

By R. B. DIXON

In the beginning there was no sun, no moon, no stars. All was dark, and everywhere there was only water. A raft came floating on the water. It came from the north, and in it were two persons—Turtle (A'nōsma) and Father-of-the-Secret-Society (Pehéipè). The stream flowed very rapidly. Then from the sky a rope of feathers, called Pō'kelma, was let down, and down it came Earth-Initiate. When he reached the end of the rope, he tied it to the bow of the raft and stepped in. His face was covered and was never seen, but his body shone like the sun. He sat down, and for a long time said nothing. At last Turtle said, "Where do you come from?" and Earth-Initiate answered, "I come from above." Then Turtle said, "Brother, can you not make for me some good dry land, so that I may sometimes come up out of the water?" Then he asked another time, "Are there going to be any people in the world?" Earth-Initiate thought awhile, then said, "Yes." Turtle asked, "How long before you are going to make people?" Earth-Initiate replied, "I don't know. You want to have some dry land: well, how am I going to get any earth to make it of?" Turtle answered, "If you will tie a rock about my left arm, I'll dive for some." Earth-Initiate did as Turtle asked, and then, reaching around, took the end of a rope from somewhere, and tied it to Turtle. When Earth-Initiate came to the raft there was no rope there; he just reached out and found one. Turtle said: "If the rope is not long enough, I'll jerk it once, and you must haul me up; if it is long enough, I'll give two jerks, and then you must pull me up quickly, as I shall have all the earth that I can carry." Just as Turtle went over the side of the boat, Father-of-the-Secret-Society began to shout loudly.

Turtle was gone a long time. He was gone six years; and when he came up, he was covered with green slime, he had been down so long. When he reached the top of the water, the only earth he had was very little under his nails; the rest had all washed away. Earth-Initiate took with his right hand a stone knife from under his left armpit, and carefully scraped the earth out from under Turtle's nails. He put the earth in the palm of his hand, and rolled it about till it was round; it was as large as a small pebble. He laid it on the stern of

¹From R. B. Dixon, "Maidu Myths," *Bulletin of the American Museum of Natural History*, volume 17, pages 39-45.

the raft. By and by he went to look at it; it had not grown at all. The third time that he went to look at it, it had grown so that it could be spanned by the arms. The fourth time he looked, it was as big as the world, the raft was aground, and all around were mountains as far as he could see. The raft came ashore at Ta'doikö, and the place can be seen today.

When the raft had come to land, Turtle said: "I can't stay in the dark all the time. Can't you make a light, so that I can see?" Earth-Initiate replied, "Let us get out of the raft, and then we will see what we can do." So all three got out. Then Earth-Initiate said: "Look that way to the east! I am going to tell my sister to come up." Then it began to grow light, and day began to break; then Father-of-the-Secret-Society began to shout loudly, and the sun came up. Turtle said, "Which way is the sun going to travel?" Earth-Initiate answered, "I'll tell her to go this way, and go down there." After the sun went down, Father-of-the-Secret-Society began to cry and shout again, and it grew very dark. Earth-Initiate said, "I'll tell my brother to come up." Then the moon rose. Then Earth-Initiate asked Turtle and Father-of-the-Secret-Society, "How do you like it?" and they both answered, "It is very good." Then Turtle asked, "Is that all you are going to do for us?" and Earth-Initiate answered, "No, I am going to do more yet." Then he called the stars each by its name, and they came out. When this was done, Turtle asked, "Now what shall we do?" Earth-Initiate replied, "Wait, and I'll show you." Then he made a tree grow at Ta'doikö—the tree called Hu'kĩmtsa; and Earth-Initiate and Turtle and Father-of-the-Secret-Society sat in its shade for two days. The tree was very large, and had twelve different kinds of acorns growing on it.

After they had sat two days under the tree, they all went off to see the world that Earth-Initiate had made. They started at sunrise, and were back by sunset. Earth-Initiate travelled so fast that all they could see was a ball of fire flashing about under the ground and the water. While they were gone, Coyote (Olä'li) and his dog Rattlesnake (Ka'udi, *or* So'la) came up out of the ground. It is said that Coyote could see Earth-Initiate's face. When Earth-Initiate and the others came back, they found Coyote at Ta'doikö. All five of them then built huts for themselves, and lived there at Ta'doikö, but no one could go inside of Earth-Initiate's house. Soon after the travellers came back, Earth-Initiate called the birds from the air, and made the trees and then the animals. He took some mud, and of this made first a deer; after that, he made all the other animals. Sometimes Turtle would say, "That does not look well; can't you make it some other way?"

Some time after this, Earth-Initiate and Coyote were at Marysville Buttes (E'stobüsin yä'mani). Earth-Initiate said, "I am going to make people." In the middle of the afternoon he began, for he had returned to Ta'doikö. He took dark red earth, mixed it with water, and made two figures—one a man, and one a woman. He laid the man on his right side, and the woman on his left, inside his house. Then he lay down himself, flat on his back, with

his arms stretched out. He lay thus and sweated all the afternoon and night. Early in the morning the woman began to tickle him in the side. He kept very still, did not laugh. By and by he got up, thrust a piece of pitchwood into the ground, and fire burst out. The two people were very white. No one to-day is as white as they were. Their eyes were pink, their hair was black, their teeth shone brightly, and they were very handsome. It is said that Earth-Initiate did not finish the hands of the people, as he did not know how it would be best to do it. Coyote saw the people, and suggested that they ought to have hands like his. Earth-Initiate said, "No, their hands shall be like mine." Then he finished them. When Coyote asked why their hands were to be like that, Earth-Initiate answered, "So that, if they are chased by bears, they can climb trees." This first man was called Ku'ksū; and the woman, Morning Star Woman (La'idamlülüm kü'le).

When Coyote had seen the two people, he thought: "That is not difficult. I'll do it myself." He did just as Earth-Initiate had told him, but could not help laughing, when, early in the morning, the woman poked him in the ribs. As a result of his failing to keep still, the people were glass-eyed. Earth-Initiate said, "I told you not to laugh," but Coyote declared he had not. This was the first lie.

By and by there came to be a good many people. Earth-Initiate had wanted to have everything comfortable and easy for people, so that none of them should have to work. All fruits were easy to obtain, no one was ever to get sick and die. As the people grew numerous, Earth-Initiate did not come as often as formerly, he only came to see Ku'ksū in the night. One night he said to him: "To-morrow morning you must go to the little lake near here. Take all the people with you. I'll make you a very old man before you get to the lake." So in the morning Ku'ksū collected all the people, and went to the lake. By the time he had reached it, he was a very old man. He fell into the lake, and sank down out of sight. Pretty soon the ground began to shake, the waves overflowed the shore, and there was a great roaring under the water, like thunder. By and by Ku'ksū came up out of the water, but young again, just like a young man. Then Earth-Initiate came and spoke to the people, and said: "If you do as I tell you, everything will be well. When any of you grow old, so old that you cannot walk, come to this lake, or get some one to bring you here. You must then go down into the water as you have seen Ku'ksū do, and you will come out young again." When he had said this, he went away. He left in the night, and went up above.

All this time food had been easy to get, as Earth-Initiate had wished. The women set out baskets at night, and in the morning they found them full of food, all ready to eat, and lukewarm. One day Coyote came along. He asked the people how they lived, and they told him that all they had to do was to eat and sleep. Coyote replied, "That is no way to do: I can show you something better." Then he told them how he and Earth-Initiate had had a discussion before men had been made; how Earth-Initiate wanted everything

easy, and that there should be no sickness or death, but how he had thought it would be better to have people work, get sick, and die. He said, "We'll have a burning." The people did not know what he meant; but Coyote said, "I'll show you. It is better to have a burning, for then the widows can be free." So he took all the baskets and things that the people had, hung them up on poles, made everything all ready. When all was prepared, Coyote said, "At this time you must always have games." So he fixed the moon during which these games were to be played.

Coyote told them to start the games with a foot-race, and every one got ready to run. Ku'ksū did not come, however. He sat in his hut alone, and was sad, for he knew what was going to occur. Just as this moment Rattlesnake came to Ku'ksū, and said, "What shall we do now? Everything is spoiled!" Ku'ksū did not answer, so Rattlesnake said, "Well, I'll do what I think is best." Then he went out and along the course that the racers were to go over, and hid himself, leaving his head just sticking out of a hole. By this time all the racers had started, and among them Coyote's son. He was Coyote's only child, and was very quick. He soon began to outstrip all the runners, and was in the lead. As he passed the spot where Rattlesnake had hidden himself, however, Rattlesnake raised his head and bit the boy in the ankle. In a minute the boy was dead.

Coyote was dancing about the home-stake. He was very happy, and was shouting at his son and praising him. When Rattlesnake bit the boy, and he fell dead, every one laughed at Coyote, and said, "Your son has fallen down, and is so ashamed that he does not dare to get up." Coyote said, "No, that is not it. He is dead." This was the first death. The people, however, did not understand, and picked the boy up, and brought him to Coyote. Then Coyote began to cry, and every one did the same. These were the first tears. Then Coyote took his son's body and carried it to the lake of which Earth-Initiate had told them, and threw the body in. But there was no noise, and nothing happened, and the body drifted about for four days on the surface, like a log. On the fifth day Coyote took four sacks of beads and brought them to Ku'ksū, begging him to restore his son to life. Ku'ksū did not answer. For five days Coyote begged, then Ku'ksū came out of his house, bringing all his beads and bear-skins, and calling to all the people to come and watch him. He laid the body on a bear-skin, dressed it, and wrapped it up carefully. Then he dug a grave, put the body into it, and covered it up. Then he told the people, "From now on, this is what you must do. This is the way you must do till the world shall be made over."

About a year after this, in the spring, all was changed. Up to this time everybody spoke the same language. The people were having a burning, everything was ready for the next day, when in the night everybody suddenly began to speak a different language. Each man and his wife, however, spoke the same. Earth-Initiate had come in the night to Ku'ksū, and had told him about it all, and given him instructions for the next day. So, when morning

came, Ku'ksū called all the people together, for he was able to speak all the languages. He told them each the names of the different animals, etc., in their languages, taught them how to cook and to hunt, gave them all their laws, and set the time for all their dances and festivals. Then he called each tribe by name, and sent them off in different directions, telling them where they were to live. He sent the warriors to the north, the singers to the west, the flute-players to the east and the dancers to the south. So all the people went away, and left Ku'ksū and his wife alone at Ta'doikō. By and by his wife went away, leaving in the night, and going first to Marysville Buttes. Ku'ksū staid a little while longer, and then he also left. He too went to the Buttes, went into the spirit house (Kukinim Kumi), and sat down on the south side. He found Coyote's son there, sitting on the north side. The door was on the west. Coyote had been trying to find out where Ku'ksū had gone, and where his own son had gone, and at last found the tracks, and followed them to the spirit house. Here he saw Ku'ksū and his son, the latter eating spirit food (Ku'kinim pë). Coyote wanted to go in, but Ku'ksū said, "No, wait there. You have just what you wanted, it is your own fault. Every man will now have all kinds of troubles and accidents, will have to work to get his food, and will die and be buried. This must go on till the time is out, and Earth-Initiate comes again, and everything will be made over. You must go home, and tell all the people that you have seen your son, that he is not dead." Coyote said he would go, but that he was hungry, and wanted some of the food. Ku'ksū replied, "You cannot eat that. Only ghosts may eat that food." Then Coyote went away and told all the people, "I saw my son and Ku'ksū, and he told me to kill myself." So he climbed up to the top of a tall tree, jumped off and was killed. Then he went to the spirit house, thinking he could now have some of the food; but there was no one there, nothing at all, and so he went out, and walked away to the west, and was never seen again. Ku'ksū and Coyote's son, however, had gone up above.

53. THE CREATION ACCORDING TO THE TLINGIT INDIANS OF SOUTHERN ALASKA¹

By JOHN R. SWANTON

At the beginning of things there was no daylight and the world lay in blackness. Then there lived in a house at the head of Nass river a being called Nasshakiyel "Raven-at-the-head-of-Nass," (the principal deity to whom the Tlingit formerly prayed but whom no one had seen); and in his house were all kinds of things including sun, moon, stars, and daylight . . . With him were two old men called Old-man-who-foresees-all-troubles-in-the-world and He-who-knows-everything-that-happens. Next to Nasshakiyel, they prayed to the latter of these. Under the earth was a third old person, Old-woman-underneath, placed under the world by Nasshakiyel. Nasshakiyel was unmarried and lived alone with these two old men, and yet he had a daughter, a thing no one is able to explain. Nor do people know what this daughter was. The two old persons took care of her like servants, and especially they always looked into the water before she drank to see that it was perfectly clean.

First of all beings Nasshakiyel created the Heron as a very tall and very wise man, and after him the Raven (Yel), who was also a very good and very wise man at that time.

Raven came into being in this wise. His first mother had many children, but they all died young, and she cried over them continually. According to some, this woman was Nasshakiyel's sister and it was Nasshakiyel who was doing this because he did not wish her to have any male children. By and by Heron came to her and said, "What is it that you are crying about all the time?" She answered, "I am always losing my children. I can not bring them up." Then he said, "Go down on the beach when the tide is lowest, get a small, smooth stone, and put it into the fire. When it is red hot, swallow it. Do not be afraid." She said, "All right." Then she followed Heron's directions and gave birth to Raven. Therefore Raven's name was really Ichak, the name of a very hard rock, and he was hence called Hammer-father. This is why Raven was so tough and could not easily be killed.

¹John R. Swanton, "Tlingit Myths and Texts," *Bulletin 39, Bureau of American Ethnology*, 1909. The passages here given are from the first twenty-eight pages of a long myth entitled "31. Raven," which fills pages 81 to 154. The spelling of the native names has been somewhat simplified in the present extract.

Heron and Raven both became servants to Nasshakiyel, but he thought more of Raven and made him head man over the world. Then Nasshakiyel made some people.

All of the beings Nasshakiyel had created, however, existed in darkness, and this existence lasted for a long time, how long is unknown. But Raven felt very sorry for the few people in darkness, and, at last, he said to himself, "If I were only the son of Nasshakiyel I could do almost anything." So he studied what he should do and decided upon a plan. He made himself very small, turned himself into a hemlock needle, and floated upon the water Nasshakiyel's daughter was about to drink. Then she swallowed it and soon after became pregnant.

Although all this was by the will of Nasshakiyel and although he knew what was the matter with his daughter, yet he asked her how she had gotten into that condition. She said, "I drank water, and I felt that I had swallowed something in it." Then Nasshakiyel instructed them to get moss for his daughter to lie upon, and on that the child was born. They named him Nasshakiyel also. Then Nasshakiyel cut a basket in two and used half of it for a cradle, and he said that people would do the same thing in future times, so they have since referred its use to him.

Nasshakiyel tried to make human beings out of a rock and out of a leaf at the same time, but the rock was slow while the leaf was very quick. Therefore human beings came from the leaf. Then he showed a leaf to the human beings and said, "You see this leaf. You are to be like it. When it falls off the branch and rots there is nothing left of it." That is why there is death in the world. If men had come from the rock there would be no death. Years ago people used to say when they were getting old, "We are unfortunate in not having been made from a rock. Being made from a leaf, we must die."

Nasshakiyel also said, "After people die, if they are not witches, and do not lie or steal, there is a good place for them to go to." Wicked people are to be dogs and such low animals hereafter. The place for good people is above, and, when one comes up there, he is asked, "What were you killed for?" or "What was your life in the world?" The place he went to was governed by his reply. So people used to say to their children, "Do not lie. Do not steal. For the Maker (Nasshakiyel) will see you."

Some time afterward a man died, and Raven, coming into the house, saw him there with his wife and children weeping around him. So he raised the dead man's blanket with both hands, held it over the body, and brought him back to life.

After that both Raven and her husband told this woman that there was no death, but she disbelieved them. Then Raven said to her, "Lie down and go to sleep." And, as she slept, she thought she saw a wide trail with many people upon it and all kinds of fierce animals around. Good people had to pass along this trail in order to live again. When she came to the end of the trail there was a great river there, and a canoe came across to her from the

other side of it. She entered this and crossed. There some people came to her and said, "You had better go back. We are not in a good place. There is starvation here, we are cold, and we get no water to drink."

This is why people burn the bodies of the dead and put food into the fire for them to eat. Burning their bodies makes the dead comfortable. If they were not burned their spirits would be cold. This is why they invite all those of the opposite clan as well as the nearest relations of the dead man's wife, seating them together in one place, and burn food in front of them. It is because they think that the dead person gets all of the property destroyed at the feast and all of the food then burned up. It is on account of what Raven showed them that they do so.

Because Nasshakiyel got it into his mind to wish for daylight in the world, he had wished for a grandchild through whom it might come. Now, therefore, although he knew what answer he would receive, he sent for He-who-knows-everything-that-happens and questioned him to see whether he would answer right: "Where did this child come from? Whose is it? Can you tell?" And the other said, "His eyes look like the eyes of Raven." That is how he came to get the name Raven.

After a while the baby began to crawl about. His grandfather thought a great deal of him and let him play with everything in the house. Everything in the house was his. The Raven began crying for the moon, until finally they handed it to him and quick as a wink he let it go up into the sky. After he had obtained everything else, he began to cry for the box in which daylight was stored. He cried, cried, cried for a very long time, until he looked as though he were getting very sick, and finally his grandfather said, "Bring my child here." So they handed Raven to his grandfather. Then his grandfather said to him, "My grandchild, I am giving you the last thing I have in the world." So he gave it to him.

Then Raven, who was already quite large, walked down along the bank of Nass river until he heard the noise people were making as they fished along the shore for eulachon in the darkness. All the people in the world then lived at one place at the mouth of the Nass. They had already heard that Nasshakiyel had something called "daylight," which would some day come into the world, and they used to talk about it a great deal. They were afraid of it.

Then Raven shouted to the fishermen, "Why do you make so much noise? If you make so much noise I will break daylight on you." Eight canoe loads of people were fishing there. But they answered, "You are not Nasshakiyel. How can you have the daylight?", and the noise continued. Then Raven opened the box a little and light shot over the world like lightning. At that they made still more noise. So he opened the box completely and there was daylight everywhere.

When this daylight burst upon the people they were very much frightened, and some ran into the water, some into the woods. Those that had hair-seal or fur-seal skins for clothing ran into the water and became hair seals and fur

seals. Hair seal and fur seal were formerly only the names of the clothing they had. Those who had skins called marten skins, black-bear skins, grizzly-bear skins, etc., ran into the woods and turned into such animals.

Petrel was one of the first persons created by Nasshakiyel. He was keeper of the fresh water, and would let none else touch it. The spring he owned was on a rocky island outside of Kuiu, called Dekinu, where the well may still be seen. Raven stole a great mouthful of this water and dropped it here and there as he went along. This is the origin of the great rivers of the world, the Nass, Skeena, Stikine, Chilkat, and others. He said, "This thing that I drop here and there will whirl all the time. It will not overflow the world, yet there will be plenty of water." Before this time Raven is said to have been pure white, but, as he was flying up through the smoke hole with Petrel's water, the latter said, "Spirits, hold down my smoke hole." So they held him until he was turned black by the smoke.

After this Raven saw a fire far out at sea. Tying a piece of pitchwood to a chicken hawk's bill, he told him to go out to this fire, touch it with the pitchwood, and bring it back. When he had brought it to him Raven put it into the rock and the red cedar saying, "This is how you are to get your fire, from this rock and this red cedar," and that is the way they formerly did.

Thus Raven went about among the natives of Alaska telling them what to do, but Nasshakiyel they never saw. Raven showed all the Tlingit what to do for a living, but he did not get to be such a high person as Nasshakiyel, and he taught the people much foolishness. At that time the world was full of dangerous animals and fish. Raven also tied up some witches, and so it was through him that the people believed in witchcraft. Then he told the people that some wild animals were to be their friends (i. e., their crest animals) to which they were to talk.

Once he gave a feast and invited persons to it from other places. He had two slaves after that, named Gidzaget and Gidzanuku. This is why the natives here had slaves. It was on account of his example. There was a man who had no arm, so Raven thought he would be a shaman and cure him. This is how the Tlingit came to have shamans. After there was death he showed them how to dance over the body placed in the middle of the floor.

Raven also taught the people how to make halibut hooks, and went out fishing with them. He had names for the halibut hooks and talked to them before he let them down into the sea. That is why the natives do so now. He also taught them to be very quick when they went out halibut fishing or they would catch nothing.

He also made different kinds of fish traps and taught the people how to use them. He made the small variety and a big trap, shaped like a barrel, for use in the Stikine. . . .

Then he showed them how to make a canoe. This he did on the Queen Charlotte islands. At first the people were afraid to get into it, but he said, "The canoe is not dangerous. People will seldom get drowned."

He taught them how to catch a salmon called ishken, which requires a different kind of hook from that used for halibut. The place where he taught people how to get different kinds of shellfish is a beach on the Queen Charlotte islands called Raven's beach to this day.

After he was through teaching the people these things, he went under the ocean, and when he came back, taught them that the sea animals are not what we think they are, but are like human beings. First he went to the halibut people. They have a chief who invited him to eat, and had dried devilfish and other kinds of dried fish brought out. He was well liked everywhere he went under the sea because he was a very smart man. After that he went to see the sculpin people, who were very industrious and had all kinds of things in their houses. The killer-whale people seemed to live on hair-seal meat, fat, and oil. Their head chief was named Gonakadet, and even to this day the natives say that the sight of him brings good fortune.

While he was under the ocean he saw some people fishing for halibut, and he tried to tease them by taking hold of their bait. They, however, caught him by the bill and pulled him up as far as the bottom of their canoe, where he braced himself so that they pulled his bill out. They did not know what this bill was and called it "bill-of-something-unknown." Then Raven went from house to house inquiring for his bill until he came to the house of the chief. Upon asking for it there, they handed it to him wrapped in eagle down. Then he put it back into its place and flew off through the smoke hole.

Raven left that town and came to another. There he saw a king salmon jumping about far out at sea. He got it ashore and killed it. Because he was able to do everything, the natives did all that he told them. He was the one who taught all things to the natives, and some of them still follow his teachings. After that he got all kinds of birds for his servants. It was through these that people found out he was the Raven.

Once he went to a certain place and told the people to go and fight others. He said, "You go there and kill them all, and you will have all the things in that town." This was the beginning of war.

After having been down among the fish teaching them, Raven went among the birds and land animals. He said to the grouse, "You are to live in a place where it is wintry, and you will always look out for a place high up so that you can get plenty of breeze." Then he handed the grouse four white pebbles, telling him to swallow them so that they might become his strength. "You will never starve," he said, "so long as you have these four pebbles." He also said, "You know that Sealion is your grandchild. You must be generous, get four more pebbles and give them to him." That is how the sealion came to have four large pebbles. It throws these at hunters, and, if one strikes a person, it kills him. From this story it is known that the grouse and the sealion can understand each other.

Raven said to the ptarmigan: "You will be the maker of snowshoes. You will know how to travel in snow." It was from these birds that the Athapas-

cans learned how to make snowshoes, and it was from them that they learned how to put their lacings on.

Next Raven came to the "wild canary," which is found in the Tlingit country all the year round, and said: "You will be head among the very small birds. You are not to live on what human beings eat. Keep away from them."

Then he went to the robin and said: "You will make the people happy by letting them hear your whistle. You will be a good whistler." . . .

Raven observed certain regulations very strictly when he was among the rivers he had created. He told people never to mention anything that lives in the sea by its right name while they were there, but to call a seal a rabbit, for instance, and so with the other animals. This was to keep them from meeting with misfortune among the rapids. Formerly the Indians were very strict with their children when they went up the rivers, but nowadays all that has been forgotten.

After this Raven went to Chilkat and entered a sweat house along with the chief of the killer whales who tried to roast him. Raven, however, had a piece of ice near him and every now and then put part of it into his mouth. Then he would tell the killer whale that he felt chilly and make him feel ashamed. "If I did not belong to the Ganahtedi family," said Raven, "I could not have stood that sweat house." For this reason the Ganahtedi now claim the raven as an emblem and think they have more right to it than anybody else.

It was from Raven that people found out there are Athapascan Indians. He went back into their country. So the Chilkat people to this day make their money by going thither. He also showed the Chilkat people how to make teil, secret storehouses maintained some distance out of town, and he taught them how to put salmon into these and keep them frozen there over winter. So the Chilkat people got their name from teil, "storehouse," and hat, "salmon."

Raven also showed the Chilkat people the first seeds of the Indian tobacco and taught them how to plant it. After it was grown up, he dried it, gathered clam shells, roasted them until they were very soft, and pounded them up with the tobacco. They used to chew this, and it was so good that it is surprising they gave it up. They made a great deal of money at Chilkat by trading with this among the interior Indians, but nowadays it is no longer planted. . . .

One day Raven saw a whale far out at sea and sat down on the beach to study how he should bring it ashore. Then he got some pitchwood and rocks of the kind that was formerly used in making fire, flew out to the place where he thought the whale would come up, and went into its open mouth. He made a fire inside of the whale and cooked everything there. Only he would not touch the heart. When the whale took in many fish he ate them. Finally he did cut the whale's heart out and killed it, after which it began drifting about from place to place. Then he sang: "Let the one who wants to be

high-born like me cut the whale open and let me out, and he will be as high as I am." He also sang: "Let the whale go ashore. Let the whale go ashore on a long sandy beach." Finally he heard waves breaking on a sandy beach, and he said again: "Let the one who wants to be high-born like me cut the whale open and let me out, and he will be as high as I am." Suddenly he heard the voices of children. These children heard his voice, went home and informed their parents. Then the people all came there and cut the whale open, and Raven flew off into the woods crying "koné, koné, koné."

Raven stayed up in the woods a long time in order to get the grease and smell off of his feathers, and, when he came down again, he saw boxes and boxes of whale grease. Then he made believe he was surprised and asked the people where they got all of it. They said: "We found a whale that had come right in here where we could get it easily. So we are making oil out of it." Said he: "Did you hear anything inside when it first came ashore?" "Yes! there was some strange sound in there, and something flew out calling itself koné." Then Raven answered, "Years ago just such a thing as this happened, and all of the people of that town that heard the noise died. It brings bad luck to hear such a noise in a whale. You people must leave this right away. Don't eat any of it. Leave it here." Then all of the people believed him and left their oil there. It became his. . . .

He went along again, saw a nice fat deer, and said to it, "My friend this is you, is it?" There was a deep, narrow canyon near by and Raven laid a rotten stick across it saying, "Let us go across to the other side upon this," but the deer said, "No, I can not. It would break with me and I shall get hurt." "No, you shall see how I cross it." So Raven went over and Deer tried to follow him but fell to the bottom of the canyon and was crushed to death. Then Raven went down and ate him, stuffing himself so full that he could scarcely move. He then acted as though he were very sad and pretended to cry, saying, "My friend, my friend, he is gone." He pretended that the wild animals had devoured him.

After this Raven went to ground-hog's house for the winter. The ground-hogs go into their holes in September. At home they live like human beings and to them we are animals just as much. So Raven spent the winter with one of them and became very sick of it, but he could not get out. The ground-hog enjoyed himself very much, but Raven acted as if he were in prison and kept shouting to his companion, "Winter comes on, Winter comes on," thinking that the ground-hog had power to make the winter pass rapidly. The ground-hog had to stay in his hole for six months, and at that time he had six toes, one for each, but Raven pulled one of his toes out of each foot in order to shorten the winter. That is why he has but five nowadays.

54. THE CREATION ACCORDING TO THE ANCIENT HEBREWS¹

In the beginning God created the heaven and the earth. And the earth was without form, and void; and darkness was upon the face of the deep. And the Spirit of God moved upon the face of the waters. And God said, Let there be light: and there was light. And God saw the light, that it was good: and God divided the light from the darkness. And God called the light Day, and the darkness he called Night. And the evening and the morning were the first day.

And God said, Let there be a firmament in the midst of the waters, and let it divide the waters from the waters. And God made the firmament, and divided the waters which were under the firmament from the waters which were above the firmament: and it was so. And God called the firmament Heaven. And the evening and the morning were the second day.

And God said, Let the waters under the heaven be gathered together unto one place, and let the dry land appear: and it was so. And God called the dry land Earth; and the gathering together of the waters called he Seas: and God saw that it was good. And God said, Let the earth bring forth grass, the herb yielding seed, and the fruit tree yielding fruit after his kind, whose seed is in itself, upon the earth: and it was so. And the earth brought forth grass, and herb yielding seed after his kind, and the tree yielding fruit, whose seed was in itself, after his kind: and God saw that it was good. And the evening and the morning were the third day.

And God said, Let there be lights in the firmament of the heaven to divide the day from the night; and let them be for signs, and for seasons, and for days, and years: and let them be for lights in the firmament of the heaven to give light upon the earth: and it was so. And God made two great lights; the greater light to rule the day, and the lesser light to rule the night: he made the stars also. And God set them in the firmament of the heaven to give light upon the earth, and to rule over the day and over the night, and to divide the light from the darkness: and God saw that it was good. And the evening and the morning were the fourth day.

And God said, Let the waters bring forth abundantly the moving creature that hath life, and fowl that may fly above the earth in the open firmament of heaven. And God created great whales, and every living creature that moveth,

Extracts from the first eleven chapters of the Bible, "authorised" English version.

which the waters brought forth abundantly, after their kind, and every winged fowl after his kind: and God saw that it was good. And God blessed them, saying, Be fruitful, and multiply, and fill the waters in the seas, and let fowl multiply in the earth. And the evening and the morning were the fifth day.

And God said, Let the earth bring forth the living creature after his kind, cattle, and creeping thing, and beast of the earth after his kind: and it was so. And God made the beast of the earth after his kind, and cattle after their kind, and every thing that creepeth upon the earth after his kind: and God saw that it was good. And God said, Let us make man in our image, after our likeness: and let them have dominion over the fish of the sea, and over the fowl of the air, and over the cattle, and over all the earth, and over every creeping thing that creepeth upon the earth. So God created man in his own image, in the image of God created he him; male and female created he them. And God blessed them, and God said unto them, Be fruitful, and multiply, and replenish the earth, and subdue it: and have dominion over the fish of the sea, and over the fowl of the air, and over every living thing that moveth upon the earth. And God said, Behold, I have given you every herb bearing seed, which is upon the face of all the earth, and every tree, in the which is the fruit of a tree yielding seed; to you it shall be for meat. And to every beast of the earth, and to every fowl of the air, and to every thing that creepeth upon the earth, wherein there is life, I have given every green herb for meat: and it was so. And God saw every thing that he had made, and, behold, it was very good. And the evening and the morning were the sixth day.

Thus the heavens and the earth were finished, and all the host of them. And on the seventh day God ended his work which he had made: and he rested on the seventh day from all his work which he had made. And God blessed the seventh day, and sanctified it: because that in it he had rested from all his work which God created and made. These are the generations of the heavens and of the earth when they were created.²

In the day that the Lord God made the earth and the heavens, and every plant of the field before it was in the earth, and every herb of the field before it grew: for the Lord God had not caused it to rain upon the earth, and there was not a man to till the ground. But there went up a mist from the earth, and watered the whole face of the ground. And the Lord God formed man of the dust of the ground, and breathed into his nostrils the breath of life; and man became a living soul.

And the Lord God planted a garden eastward in Eden; and there he put the man whom he had formed. And out of the ground made the Lord God to grow every tree that is pleasant to the sight, and good for food; the tree of life also in the midst of the garden, and the tree of knowledge of good and evil. And a river went out of Eden to water the garden; and from thence it was parted, and became into four heads. The name of the first in *Pison*: that

²Genesis 1:1 to 2:4a.

is it which compasseth the whole land of Havilah, where there is gold; and the gold of that land is good: there is bdellium and the onyx stone. And the name of the second river is Gihon: the same is it that compasseth the whole land of Ethiopia. And the name of the third river is Hidekel: that is it which goeth toward the east of Assyria. And the fourth river is Euphrates. And the Lord God took the man, and put him into the garden of Eden to dress it and to keep it. And the Lord God commanded the man, saying, Of every tree of the garden thou mayest freely eat: but of the tree of the knowledge of good and evil, thou shalt not eat of it: for in the day that thou eatest thereof thou shalt surely die.

And the Lord God said, It is not good that the man should be alone; I will make him a help meet for him. And out of the ground the Lord God formed every beast of the field, and every fowl of the air; and brought them unto Adam to see what he would call them: and whatsoever Adam called every living creature, that was the name thereof. And Adam gave names to all cattle, and to the fowl of the air, and to every beast of the field; but for Adam there was not found a help meet for him. And the Lord God caused a deep sleep to fall upon Adam, and he slept; and he took one of his ribs, and closed up the flesh instead thereof. And the rib, which the Lord God had taken from man, made he a woman, and brought her unto the man. And Adam said, This is now bone of my bones, and flesh of my flesh: she shall be called Woman, because she was taken out of man. Therefore shall a man leave his father and his mother, and shall cleave unto his wife: and they shall be one flesh. And they were both naked, the man and his wife, and were not ashamed.

Now the serpent was more subtile than any beast of the field which the Lord God had made. And he said unto the woman, Yea, hath God said, Ye shall not eat of every tree of the garden? And the woman said unto the serpent, We may eat of the fruit of the trees of the garden: but of the fruit of the tree which is in the midst of the garden, God hath said, Ye shall not eat of it, neither shall ye touch it, lest ye die. And the serpent said unto the woman, Ye shall not surely die: for God doth know that in the day ye eat thereof, then your eyes shall be opened, and ye shall be as gods, knowing good and evil. And when the woman saw that the tree was good for food, and that it was pleasant to the eyes, and a tree to be desired to make one wise, she took of the fruit thereof, and did eat, and gave also unto her husband with her; and he did eat. And the eyes of them both were opened, and they knew that they were naked; and they sewed fig leaves together, and made themselves aprons.

And they heard the voice of the Lord God walking in the garden in the cool of the day: and Adam and his wife hid themselves from the presence of the Lord God amongst the trees of the garden. And the Lord God called unto Adam, and said unto him, Where art thou? And he said, I heard thy voice in the garden, and I was afraid, because I was naked; and I hid myself. And he said, Who told thee that thou wast naked? Has thou eaten of the tree,

whereof I commanded thee that thou shouldest not eat? And the man said, The Woman whom thou gavest to be with me, she gave me of the tree, and I did eat. And the Lord God said unto the woman, What is this that thou hast done? And the woman said, The serpent beguiled me, and I did eat.

And the Lord God said unto the serpent, Because thou has done this, thou art cursed above all cattle, and above every beast of the field; upon thy belly shalt thou go, and dust shalt thou eat all the days of thy life: and I will put enmity between thee and the woman, and between thy seed and her seed; it shall bruise thy head, and thou shalt bruise his heel. Unto the woman he said, I will greatly multiply thy sorrow and thy conception; in sorrow thou shalt bring forth children; and thy desire shall be to thy husband, and he shall rule over thee. And unto Adam he said, Because thou hast hearkened unto the voice of thy wife, and hast eaten of the tree, of which I commanded thee, saying, Thou shalt not eat of it: cursed is the ground for thy sake; in sorrow shalt thou eat of it all the days of thy life; thorns also and thistles shall it bring forth to thee; and thou shalt eat the herb of the field: in the sweat of thy face shalt thou eat bread, till thou return unto the ground; for out of it wast thou taken: for dust thou art, and unto dust shalt thou return.

And Adam called his wife's name Eve; because she was the mother of all living. Unto Adam also and to his wife did the Lord God make coats of skins, and clothed them.

And the Lord God said, Behold, the man is become as one of us, to know good and evil: and now, lest he put forth his hand, and take also of the tree of life, and eat, and live for ever: therefore the Lord God sent him forth from the garden of Eden, to till the ground from whence he was taken. So he drove out the man: and he placed at the east of the garden of Eden cherubim, and a flaming sword which turned every way, to keep the way of the tree of life.³

And Adam knew Eve his wife; and she conceived, and bare Cain, and said, I have gotten a man from the Lord. And she again bare his brother Abel. And Abel was a keeper of sheep, but Cain was a tiller of the ground. And in process of time it came to pass, that Cain brought of the fruit of the ground an offering unto the Lord. And Abel, he also brought of the firstlings of his flock and of the fat thereof. And the Lord had respect unto Abel and to his offering; but unto Cain and to his offering he had not respect. And Cain was very wroth, and his countenance fell. And the Lord said unto Cain, Why art thou wroth? and why is thy countenance fallen? If thou doest well, shalt thou not be accepted? and if thou doest not well, sin lieth at the door: and unto thee shall be his desire, and thou shalt rule over him. And Cain talked with Abel his brother: and it came to pass, when they were in the field, that Cain rose up against Abel his brother, and slew him.

And the Lord said unto Cain, Where is Abel thy brother? And he said, I know not: am I my brother's keeper? And he said, What hast thou done?

³Genesis 2:4b to 3:24.

the voice of thy brother's blood crieth unto me from the ground. And now art thou cursed from the earth, which hath opened her mouth to receive thy brother's blood from thy hand. When thou tillest the ground, it shall not henceforth yield unto thee her strength; a fugitive and a vagabond shalt thou be in the earth.

And Cain said unto the Lord, My punishment is greater than I can bear. Behold, thou hast driven me out this day from the face of the earth; and from thy face shall I be hid: and I shall be a fugitive and a vagabond in the earth; and it shall come to pass, that every one that findeth me shall slay me. And the Lord said unto him, Therefore whosoever slayeth Cain, vengeance shall be taken on him sevenfold. And the Lord set a mark upon Cain, lest any finding him should kill him.

And Cain went out from the presence of the Lord, and dwelt in the land of Nod, on the east of Eden. And Cain knew his wife; and she conceived, and bare Enoch: and he builded a city, and called the name of the city, after the name of his son, Enoch. And unto Enoch was born Irad: and Irad begat Mehujael: and Mehujael begat Methusael: and Methusael begat Lamech.

And Lamech took unto him two wives: the name of the one was Adah, and the name of the other Zillah. And Adah bare Jabal: he was the father of such as dwell in tents, and of such as have cattle. And his brother's name was Jubal: he was the father of all such as handle the harp and organ. And Zillah, she also bare Tubal-cain, an instructor of every artificer in brass and iron: and the sister of Tubal-cain was Naamah.

And Lamech said unto his wives, Adah and Zillah, hear my voice; ye wives of Lamech, hearken unto my speech: for I have slain a man to my wounding, and a young man to my hurt. If Cain shall be avenged sevenfold, truly Lamech seventy and sevenfold.

And Adam knew his wife again; and she bare a son, and called his name Seth: For God, said she, hath appointed me another seed instead of Abel, whom Cain slew. And to Seth, to him also there was born a son; and he called his name Enos: then began men to call upon the name of the Lord.⁴ . . .

And it came to pass, when men began to multiply on the face of the earth, and daughters were born unto them, that the sons of God saw the daughters of men that they were fair; and they took them wives of all which they chose. And the Lord said, My Spirit shall not always strive with man, for that he also is flesh: yet his days shall be a hundred and twenty years. There were giants in the earth in those days; and also after that, when the sons of God came in unto the daughters of men, and they bare children to them, the same became mighty men which were of old, men of renown.

And God saw that the wickedness of man was great in the earth, and that every imagination of the thoughts of his heart was only evil continually. And it repented the Lord that he had made man on the earth, and it grieved

⁴Genesis, ch. 4.

him at his heart. And the Lord said, I will destroy man whom I have created from the face of the earth; both man, and beast, and the creeping thing, and the fowls of the air; for it repenteth me that I have made them. But Noah found grace in the eyes of the Lord.

These are the generations of Noah: Noah was a just man and perfect in his generations, and Noah walked with God. And Noah begat three sons, Shem, Ham, and Japheth. The earth also was corrupt before God; and the earth was filled with violence. And God looked upon the earth, and, behold, it was corrupt; for all flesh had corrupted his way upon the earth.

And God said unto Noah, The end of all flesh is come before me; for the earth is filled with violence through them; and, behold, I will destroy them with the earth. Make thee an ark of gopher wood; rooms shalt thou make in the ark, and shalt pitch it within and without with pitch. And this is the fashion which thou shalt make it of: The length of the ark shall be three hundred cubits, the breadth of it fifty cubits, and the height of it thirty cubits. A window shalt thou make to the ark, and in a cubit shalt thou finish it above; and the door of the ark shalt thou set in the side thereof; with lower, second, and third stories shalt thou make it. And, behold, I, even I, do bring a flood of waters upon the earth, to destroy all flesh, wherein is the breath of life, from under heaven; and every thing that is in the earth shall die. But with thee will I establish my covenant; and thou shalt come into the ark, thou, and thy sons, and thy wife, and thy sons' wives with thee. And of every living thing of all flesh, two of every sort shalt thou bring into the ark, to keep them alive with thee; they shall be male and female. Of fowls after their kind, and of cattle after their kind, of every creeping thing of the earth after his kind; two of every sort shall come unto thee, to keep them alive. And take thou unto thee of all food that is eaten, and thou shalt gather it to thee; and it shall be for food for thee, and for them. Thus did Noah; according to all that God commanded him, so did he.

And the Lord said unto Noah, Come thou and all thy house into the ark; for thee have I seen righteous before me in this generation. Of every clean beast thou shalt take to thee by sevens, the male and his female; and of beasts that are not clean by two, the male and his female. Of fowls also of the air by sevens, and the male and the female; to keep seed alive upon the face of all the earth. For yet seven days, and I will cause it to rain upon the earth forty days and forty nights; and every living substance that I have made will I destroy from off the face of the earth.

And Noah did according unto all that the Lord commanded him. And Noah was six hundred years old when the flood of waters was upon the earth. And Noah went in, and his sons, and his wife, and his sons' wives with him, into the ark, because of the waters of the flood. Of clean beasts, and of beasts that are not clean, and of fowls, and of every thing that creepeth upon the earth, there went in two and two unto Noah into the ark, the male and the female, as God had commanded Noah.

And it came to pass after seven days, that the waters of the flood were upon the earth. In the six hundredth year of Noah's life, in the second month, the seventeenth day of the month, the same day were all the fountains of the great deep broken up, and the windows of heaven were opened. And the rain was upon the earth forty days and forty nights. In the selfsame day entered Noah, and Shem, and Ham, and Japheth, the sons of Noah, and Noah's wife, and the three wives of his sons with them, into the ark; they, and every beast after his kind, and all the cattle after their kind, and every creeping thing that creepeth upon the earth after his kind, and every fowl after his kind, every bird of every sort. And they went in unto Noah into the ark, two and two of all flesh, wherein is the breath of life. And they that went in, went in male and female of all flesh, as God had commanded him: and the Lord shut him in.

And the flood was forty days upon the earth; and the waters increased, and bare up the ark, and it was lifted up above the earth. And the waters prevailed, and were increased greatly upon the earth; and the ark went upon the face of the waters. And the waters prevailed exceedingly upon the earth; and all the high hills, that were under the whole heaven, were covered. Fifteen cubits upward did the waters prevail; and the mountains were covered. And all flesh died that moved upon the earth, both of fowl, and of cattle, and of beast, and of every creeping thing that creepeth upon the earth, and every man: all in whose nostrils was the breath of life, of all that was in the dry land, died. And every living substance was destroyed which was upon the face of the ground, both man, and cattle, and the creeping things, and the fowl of the heaven; and they were destroyed from the earth: and Noah only remained alive, and they that were with him in the ark. And the waters prevailed upon the earth a hundred and fifty days.

And God remembered Noah, and every living thing, and all the cattle that was with him in the ark: and God made a wind to pass over the earth, and the waters assuaged. The fountains also of the deep and the windows of heaven were stopped, and the rain from heaven was restrained. And the waters returned from off the earth continually: and after the end of the hundred and fifty days the waters were abated. And the ark rested in the seventh month, on the seventeenth day of the month, upon the mountains of Ararat. And the waters decreased continually until the tenth month: in the tenth month, on the first day of the month, were the tops of the mountains seen.

And it came to pass at the end of forty days, that Noah opened the window of the ark which he had made: and he sent forth a raven, which went forth to and fro, until the waters were dried up from off the earth. Also he sent forth a dove from him, to see if the waters were abated from off the face of the earth. But the dove found no rest for the sole of her foot, and she returned unto him into the ark; for the waters were on the face of the whole earth. Then he put forth his hand, and took her, and pulled her in unto him into the ark. And he stayed yet other seven days; and again he sent forth the dove out of the ark. And the dove came in to him in the evening, and, lo, in her mouth was an

olive leaf plucked off: so Noah knew that the waters were abated from off the earth. And he stayed yet other seven days, and sent forth the dove, which returned not again unto him any more.

And it came to pass in the six hundredth and first year, in the first month, the first day of the month, the waters were dried up from off the earth: and Noah removed the covering of the ark, and looked, and, behold, the face of the ground was dry. And in the second month, on the seven and twentieth day of the month, was the earth dried.

And God spake unto Noah, saying, Go forth of the ark, thou, and thy wife, and thy sons, and thy sons' wives with thee. Bring forth with thee every living thing that is with thee, of all flesh, both of fowl, and of cattle, and of every creeping thing that creepeth upon the earth; that they may breed abundantly in the earth, and be fruitful, and multiply upon the earth.

And Noah went forth, and his sons, and his wife, and his sons' wives with him: every beast, every creeping thing, and every fowl, and whatsoever creepeth upon the earth, after their kinds, went forth out of the ark.

And Noah builded an altar unto the Lord; and took of every clean beast, and of every clean fowl, and offered burnt offerings on the altar. And the Lord smelled a sweet savour; and the Lord said in his heart, I will not again curse the ground any more for man's sake; for the imaginations of man's heart is evil from his youth: neither will I again smite any more every thing living, as I have done. While the earth remaineth, seedtime and harvest, and cold and heat, and summer and winter, and day and night shall not cease.⁵

And the whole earth was of one language, and of one speech. And it came to pass, as they journeyed from the east, that they found a plain in the land of Shinar; and they dwelt there. And they said one to another, Go to, let us make brick, and burn them thoroughly. And they had brick for stone, and slime had they for mortar. And they said, Go to, let us build us a city, and a tower, whose top may reach unto heaven; and let us make us a name, lest we be scattered abroad upon the face of the whole earth.

And the Lord came down to see the city and the tower, which the children of men builded. And the Lord said, Behold, the people is one, and they have all one language; and this they begin to do: and now nothing will be restrained from them, which they have imagined to do. Go to, let us go down, and there confound their language, that they may not understand one another's speech.

So the Lord scattered them abroad from thence upon the face of all the earth: and they left off to build the city. Therefore is the name of it called Babel; because the Lord did there confound the language of all the earth: and from thence did the Lord scatter them abroad upon the face of all the earth.⁶

⁵Genesis, ch. 6-8.

⁶Genesis, 11:1 to 11:9.

BIBLIOGRAPHY

A. EVOLUTION, HEREDITY, RACE

NATURE AND HISTORY OF ANTHROPOLOGY

A brief discussion of the scope of anthropology and its relation to other lines of study will be found in chapter 1 of *Anthropology*, by R. R. Marett. Some of the things he says are both true and important. The article "Anthropology" in the *Encyclopaedia Britannica* is by one of the founders of the science, Professor E. B. Tylor. A. C. Haddon, *History of Anthropology*, is the most complete work readily available on its subject in English.

EVOLUTION

Concerning the evolutionary process in its broadest aspects, excellent works are: D. S. Jordan and V. L. Kellogg, *Evolution and Animal Life*; R. H. Lock, *Recent Progress in the Study of Variation, Heredity, and Evolution*; M. M. Metcalf, *Outlines of the Theory of Organic Evolution*. The most important work historically is Charles Darwin, *The Origin of Species*. The first chapter of Ernst Haeckel, *The Evolution of Man*, is worth attention. A valuable collection of essays is *Fifty Years of Darwinism*, by several authors. Other works of importance are: August Weismann, *The Evolution Theory*; W. E. Castle, *Genetics and Eugenics*, especially the first three chapters; and the second volume of G. W. Romanes, *Darwin and After Darwin*.

On organic evolution and its relation to man, a number of excellent books have been written. Historically, the most important is again a work by Darwin, *The Descent of Man*. Thomas H. Huxley, *Man's Place in Nature*, is also fundamental. The most systematic treatise on this subject is Ernst Haeckel, *The Evolution of Man*, already mentioned. Though his ideas are not always accepted by other scientists, Haeckel is an undoubted master of presentation.

Concerning fossils, one of the most entertaining books in the world is E. Ray Lankester, *Extinct Animals*, which contains moreover nothing which is not scientifically accurate. Another work of somewhat similar character, on fossil remains, is Frederic A. Lucas, *Animals of the Past*.

Concerning embryology and its bearing on evolutionary doctrine, there are important passages in Huxley, *Man's Place in Nature*. The fullest work is Haeckel, *The Evolution of Man*.¹ Ludwig Hopf, *The Human Species*, is sound and well written, and G. W. Romanes, *Darwin and After Darwin*, vol. 1, chap.

4, will be found of value. On vestigial organs, Darwin, *The Descent of Man*, contains a good deal of material, and Elie Metchnikoff, *The Nature of Man*, devotes nearly a chapter to it.

On specifically human traits, good books are W. L. H. Duckworth, *Morphology and Anthropology*; Arthur Keith, *Man, a History of the Human Body*, and Ludwig Hopf, *The Human Species*, previously cited. R. MacDougall, "The Significance of the Human Hand in the Evolution of Mind," in *American Journal of Psychology*, vol. 16, pp. 232-242, is of interest; and the same may be said of D. J. Cunningham, "Right-handedness and Left-handedness," in *Journal of the Royal Anthropological Institute*, vol. 32, pp. 273-296.

On sex there may be mentioned P. Geddes and A. J. Thompson, *The Evolution of Sex*, and Havelock Ellis, *Man and Woman: A Study of Human Secondary Characters*.

THE DEVELOPMENT OF MIND

On intelligence among the lower animals there is a good deal of material in Darwin, *The Descent of Man*, chap. 3. A book which is thoroughly characteristic of the best modern scientific research along these lines is S. J. Holmes, *The Evolution of Animal Intelligence*. Other works of importance are: E. L. Thorndike, *Animal Intelligence*; Lloyd Morgan, *Animal Intelligence*; and M. Washburn, *Animal Mind*.

On the distinction between instinct and custom August Weismann has a very clear discussion, under the title, "The Musical Sense in Animals and Man," in his *Essays Upon Heredity*, vol. 2. Concerning the life and growth of customs, one of the best references is W. G. Sumner, *Folkways*.

On the subject of language, W. D. Whitney, *The Life and Growth of Language*, is a classic. André Lefèvre, *Race and Language* (part I), is less sound but rather more pertinent for the anthropological student. E. B. Tylor, *Anthropology*, contains some interesting chapters on language (4, 5, 6). The first six pages of the article "Philology" in the eleventh edition of the *Encyclopaedia Britannica* will be found very useful. The earliest development of human speech is however a very difficult subject, since actual evidence is practically lacking.

THE APES

On the man-like apes comparatively little satisfactory reading can be cited. Not a great deal is known about their habits, compared to our knowledge of more commonplace animals, and the literature which exists is mostly highly technical or highly inaccurate. The first essay in Huxley, *Man's Place in Nature*, deals with the apes, but is somewhat antiquated now. The encyclopaedic natural histories, such as Richard Lydeker's *The New Natural History*, the *Riverside Natural History*, or the *Standard Library of Natural History*,

contain a good deal of material of varying degrees of importance. Probably the best thing of this kind is the seventeenth chapter of volume 10 of the *Cambridge Natural History*. F. Wood Jones, *Arboreal Man*, is useful. D. G. Elliot, *A Review of the Primates*, is technical. S. J. Holmes, *The Evolution of Animal Intelligence*, and Darwin, *The Descent of Man*, both include material on the behavior of the higher apes. R. L. Garner, *Gorillas and Chimpanzees*, and *The Man-like Apes*, are full of enthusiasm and mistakes. A characteristic summary is Haeckel, *Evolution of Man*, chap. 1.

Concerning the evolutionary relation of man to these apes, the best works in English are Haeckel, as just cited, vol. 2, chap. 23; St. George J. Mivart, *Man and Apes*; Darwin, *Descent of Man*; Huxley, *Man's Place in Nature*; W. L. H. Duckworth, *Morphology and Anthropology*, vol. 1 (1915 edition).

FOSSIL MAN

On the fossil remains of early man one of the best works is Aleš Hrdlička, "The Most Ancient Skeletal Remains of Man," in the *Smithsonian Report* for 1913. Others are W. J. Sollas, *Ancient Hunters*; H. F. Osborn, *Men of the Old Stone Age*; W. L. H. Duckworth, *Prehistoric Man*; Arthur Keith, *Ancient Types of Man*; Robert Munro, *Palaeolithic Man*. Of the last named Osborn is the most compendious.

Concerning "fossil" man in America, everything necessary for ordinary purposes has been said by Aleš Hrdlička in two monographs, *Skeletal Remains Attributed to Early Man in North America*, and *Ancient Man in South America* (Bulletins 33 and 52 of the Bureau of American Ethnology).

PREHISTORY

On the very earliest stone tools (so old that their identity is uncertain) a full reference is G. G. MacCurdy, "The Eolithic Problem," in *American Anthropologist*, new series, vol. 7, pp. 324-479. In E. B. Tylor, *Early History of Mankind*, pp. 194-230, there is an excellent chapter on the stone age. For the stone age in general, *The British Museum Stone Age Guide* is useful. Robert Munro, *Prehistoric Britain*, is compact, and the article "Archaeology," in the *Encyclopaedia Britannica* (eleventh edition) is convenient. On the palaeolithic or old stone age the works by W. J. Sollas and H. F. Osborn mentioned in a preceding paragraph give similar material in greater detail, are interestingly and clearly written, and fully illustrated. Osborn dwells at length on the gradual development traceable in the old stone age, on the side of art as well as tools. Sollas is lively reading, but his comparisons with modern savages are somewhat misleading.

From the abundant literature on the neolithic period there might be cited: Robert Munro, *Palaeolithic Man and Terramara Settlements in Europe*; *Prehistoric Britain*; *The Lake Dwellings of Europe*; Ferdinand Keller, *The Lake*

Dwellings of Switzerland; John Evans, *Ancient Stone Implements*; W. Boyd Dawkins, *Cave Hunting and Early Man in Britain*; Neil Gordon Munro, *Pre-historic Japan*; Max Uhle, *The Emeryville Shellmound*; N. C. Nelson, *Shellmounds of the San Francisco Bay Region* and *The Ellis Landing Shellmound*. The last three are printed in *University of California Publications in American Archaeology and Ethnology*, vol. 7.

On prehistoric art there are H. G. Spearing, *The Childhood of Art*, and E. A. Parkyn, *Pre-historic Art*, both well illustrated.

HEREDITY

On heredity, the following works are recommended: W. Bateson, *Mendel's Principles of Heredity*; R. C. Punnett, *Mendelism*; W. E. Castle, *Heredity in Relation to Evolution*; H. E. Walter, *Genetics*; W. P. Ball, *Are the Effects of Use and Disuse Inherited?*; T. H. Morgan, *Heredity and Sex*; the same (and co-authors), *Mechanism of Mendelian Heredity*; W. E. Castle, *Genetics and Eugenics*; J. A. Thomson, *Heredity*; L. Doncaster, *Heredity in the Light of Recent Research*, and *The Determination of Sex*.

The works concerning the human phases of Mendelian heredity are on the whole technical. The following may be mentioned as typical: C. B. Davenport, in *Carnegie Institution Publication 188*; the same, in *Heredity and Eugenics*, pp. 269, 289; W. C. Farabee, in *Peabody Museum Papers*, vol. 3, p. 69; H. H. Goddard, *The Kallikak Family*; C. Hurst, in *Proceedings of the Royal Society of London*, vol. 80B, p. 85; A. J. Rosanoff and F. S. Orr in *Cold Springs Harbor Eugenics Record Office, Bulletin 5*. Several of the works mentioned in the last paragraph also contain chapters on Mendelian heredity in man.

On human heredity as it can be approached in other ways than from the Mendelian aspect, the fundamental works are three books by Francis Galton: *Natural Inheritance*, *Hereditary Genius*, and *Inquiries Into Human Faculty*. Karl Pearson's "On the Inheritance of the Mental and Moral Characters in Man" (*Journal of the Royal Anthropological Institute*, vol. 33; pp. 179-237) is incisive and a valuable supplement.

The literature on eugenics or the artificial control of heredity and race is abundant, controversial, and propagandist. Some of the best works, besides those cited in the last paragraph, are Galton, "Eugenics: Its Definition, Scope, and Aims," in *American Journal of Sociology*, vol. 10, pp. 1-25; Karl Pearson, "The Academic Aspect of the Source of Natural Eugenics," in *University of London Eugenics Laboratory Lecture Series* (Lecture 7); H. H. Goddard, *Feeble-mindedness*; R. L. Dugdale, *The Jukes*; C. B. Saleeby, *Parenthood and Race Culture*, and *The Progress of Eugenics*; C. B. Davenport, *Heredity in Relation to Eugenics*.

ANTHROPOMETRY AND SOMATOLOGY

On the traits and proportions of the human body which are used as a basis for the classification of the physical types of mankind, most of the good literature is in languages other than English. P. Topinard, *Anthropology*, is somewhat antiquated, and J. J. Deniker, *Races of Men*, deals largely with other matters; but both of these translations from the French are useful. Much less reliable is A. de Quatrefages, *The Human Species*. A. C. Haddon's *Study of Man* and *Races of Man* are serviceable so far as they go. W. L. H. Duckworth, *Morphology and Anthropology*, is probably the standard work written in English, but is for the special student. W. Z. Ripley, *Races of Europe* (see especially chapters 3 and 5), is meaty, free from undue technicality, and well illustrated.

THE RACES OF MEN

The classification, relation, and origin of the races of man is an interesting but obscure subject. No two authorities agree on every detail, and some differ widely. Several of the best authorities are not available in English. The following may be mentioned: the works of Topinard, Deniker, de Quatrefages, and Haddon already cited; D. G. Brinton, *Races and Peoples*. A. H. Keane, *The World's Peoples, Ethnology*, and *Man Past and Present* are readable rather than dependable. For Europe Ripley's book, just cited, is standard. An excellent supplement to it, on the side of what is often called race but is not, is L. Dominian, *Frontiers of Language and Nationality in Europe*.

RACE PROBLEMS

There is no systematic and readily intelligible literature on the distinction between human traits that are racial and those which are individual or acquired through the individual's mode of life. What has been written about the effects of climate on race is rarely scientific. C. E. Woodruff, *The Effects of Tropical Light on White Men*, may be mentioned.

On the question of the superiority of certain races and the relation between the so-called superior types and the backward peoples, there are a number of interesting books. The best are: F. Boas, *Mind of Primitive Man*, especially the first and last chapters; Jean Finot, *Race Prejudice*; Mary W. Ovington, *Half a Man*. W. E. B. DuBois, *The Negro*, and H. W. Odum, *Social and Mental Traits of the American Negro*, may also be cited. Other works presenting one side or another of the question are: M. J. Mayo, *Mental Capacity of the American Negro*; Bardin, "The Psychological Factor in the Southern Race Problem" (in *Popular Science Monthly*, vol. 83, pp. 369-374); F. Boas, "Human Faculty as Determined by Race" (in *American Association for the Advancement of Science, Proceedings*, vol. 43, pp. 301-327). The papers delivered at the First Universal Races Congress, published as *Interracial*

Problems (edited by Spiller) are, many of them, stimulating, and the same may be said of the collection of papers called "The Negro's Progress in Fifty Years" (*Annals of the American Academy of Political and Social Science*, vol. 59, no. 138). T. Waitz, *Introduction to Anthropology*, represents the modern point of view although an old work. More recent but more antiquated and dogmatic in attitude, although well written, is G. LeBon, *The Psychology of Peoples*.

On the matter of friction between different racial groups, Finot and Boas, just quoted, are among the best. Kelly Miller, *Race Adjustment*, is written by a negro. A. H. Stone, *Studies in the American Race Problem*, is a good work, and the introductory essay in Josiah Royce, *Race Questions*, is a masterpiece. On race mixture from the physical standpoint, F. Boas, "The Half-blood Indian" (*Popular Science Monthly*, October, 1894), and W. Z. Ripley, *Races of Europe*, may be consulted.

B. CIVILIZATION

SCOPE AND PSYCHOLOGY

The first chapter of J. H. Robinson, *The New History*, contains an excellent statement of the modern viewpoint for the history of man. This is quoted in part, with some additional remarks, in the Introduction to W. I. Thomas, *Source Book for Social Origins*, pp. 1-26. This entire introduction is worth reading.

For general culture evolution, two important books are E. B. Tylor, *Anthropology*, especially chap. 1, and the same author's *Primitive Culture*, chap. 2. R. H. Lowie, *Culture and Ethnology*, is modern in point of view and clear.

Several attempts have been made to formulate the psychology that underlies civilization. G. Tarde, *The Laws of Imitation*, is a famous book. E. C. Parsons, *Fear and Conventionality*, moves along different lines. W. McDougall, *An Introduction to Social Psychology*, is the most systematic treatment.

ENVIRONMENT

In the matter of the influence of geographic environment on human civilization, F. Ratzel, *History of Mankind*, while mainly descriptive, is pervaded by a definite point of view. The same attitude is developed more formally in E. C. Semple, *The Influences of Geographic Environment: On the Basis of Ratzel's System of Anthro-Geography*. W. Hough, "Environmental Interrelations in Arizona," *American Anthropologist*, new series, vol. 11, pp. 133-155, deals with a special phase of the subject.

FOOD

For a general survey of the various methods used to support life under primitive conditions, E. B. Tylor's *Anthropology* may be consulted, while details for particular areas are supplied by F. Ratzel, *The History of Mankind*. The essential facts for the New World are summarized in C. Wissler, *The American Indian*.

The best literature on the origin of the domestication of animals is in foreign languages and untranslated. Two interesting treatments of the theoretical aspects of the problem are by F. Galton, "The First Steps Toward the Domestication of Animals," and J. Crawford, "On the Relation of the Domesticated Animals to Civilization," both in *Transactions of the Ethnological Society*, new series, vol. 3, pp. 122-138, and vol. 2, 387-486, respectively.

For the particular domesticated animals the articles on the several species in the *Britannica* and other encyclopaedias are serviceable. Suggestive discussions on the reindeer, an animal domesticated chiefly by primitive peoples, are to be found in W. Jochelson, "The Koryak," in *Memoirs of the American Museum of Natural History*, vol. 10, pp. 469-501; W. Bogoras, "The Chukchee," in the same, vol. 11, pp. 70-97; and B. Laufer, "The Reindeer and its Domestication," in *Memoirs of the American Anthropological Association*, vol. 4, no. 2.

Primitive agriculture is best approached through studies of particular peoples. Of such the following are excellent: G. L. Wilson, "Agriculture of the Hidatsa Indians," in *University of Minnesota Studies in the Social Sciences*, no. 9; F. W. Hodge, "Prehistoric Irrigation in Arizona," in *American Anthropologist*, old series, vol. 6, pp. 323-330; Skeat and Blagden, *Pagan Races of the Malay Peninsula*, vol. 1, pp. 338-373; A. E. Jenks, "The Bontoc Igorot," in *Philippine Islands, Ethnological Survey Publications*, vol. 1, pp. 88-107; J. Roscoe, *The Baganda*, chap. 15.

On hunting, fishing, and the use of wild plant foods the following may be consulted: C. Rau, "Prehistoric Fishing in Europe and North America," in *Smithsonian Contributions to Knowledge*, vol. 25, pp. 1-342; Skeat and Blagden, *Pagan Race of the Malay Peninsula*, vol. 1, pp. 109-136, 200-224; C. Wissler, "Material Culture of the Blackfoot Indians," in *Anthropological Papers of the American Museum of Natural History*, vol. 5, pp. 20-53; J. O. Dorsey, "Omaha Sociology," *Bureau of American Ethnology, Third Annual Report*, chaps. 7 and 8; A. E. Jenks, "The Wild-Rice Gatherers of the Upper Lakes," in *Bureau of American Ethnology, Nineteenth Annual Report*, pp. 1013-1137. For the Indians of California there are three excellently written accounts: F. V. Coville, "Wokas, A Primitive Food of the Klamath Indians," in *Report of the U. S. National Museum for 1902*, pp. 727-739; P. E. Goddard, "Life and Culture of the Hupa," in *University of California Publications in American Archaeology and Ethnology*, vol. 1, pp. 21-32; and D. P. Barrows, *The Ethnobotany of the Coahuilla Indians of Southern California*.

SHELTER AND ARCHITECTURE

J. Fergusson, *History of Architecture*, is the classical work, although it begins where primitive construction ends. W. H. Holmes, "Ancient Cities of Mexico," *Field Museum of Natural History Publications* 8 and 16, gives a superb account of the beautiful structures, now in ruins, of Mexico and Central America. J. L. Stephens, *Incidents of Travel in Yucatan*, and *Incidents of Travel in Central America*, contain some fascinating descriptions. T. A. Joyce, *Mexican Archaeology*, pp. 169-184, 319-354, reviews the same field. G. Nordenskiöld, *The Cliff Dwellers of the Mesa Verde*, is an elaborately illustrated work on the interesting prehistoric buildings typical of the American Southwest. V. Mindeleff, "A Study of Pueblo Architecture," *Bureau of American Ethnology, Eighth Annual Report*, pp. 13-228, compares the ancient and recent Indian structures of this region. F. Boas, "The Central Eskimo," same series, *Sixth Report*, describes the snow house, one of the most specialized constructions in the world. The hogan is dealt with by C. Mindeleff, "Navaho Houses," in the *Seventeenth Report* of the same series, pp. 475-517. Another remarkable dwelling, the North American tepee, is discussed by C. Wissler, in "Material Culture of the Blackfoot Indians," *Anthropological Papers of the American Museum of Natural History*, vol. 5, pp. 99-108. A general review of the structures of the New World is to be found in the same author's *The American Indian*, pp. 100-114. L. H. Morgan, "Houses and House-Life of the American Aborigines," in *Contributions to North American Ethnology*, vol. 4, is an older work, with emphasis on the part played in Indian life by buildings, rather than on their construction.

INDUSTRIES, INVENTION, IMPLEMENTS

O. T. Mason, *The Origins of Invention*, is a good book on the evolution of contrivances of all sorts. Two other papers of general interest are W. H. Holmes, "The Order of Development of the Primal Shaping Arts," *Smithsonian Report* for 1901, pp. 501-513, and J. D. McGuire, "On the Evolution of the Art of Working in Stone," *American Anthropologist*, old series, vol. 6, pp. 307-319. J. Royce, "The Psychology of Invention," *Psychological Review*, vol. 5, pp. 113-144, is an excellent paper.

On primitive production and use of fire there are E. B. Tylor, *Early History of Mankind*, pp. 231-257; W. Hough, "Aboriginal Fire-making," in *American Anthropologist*, old series, vol. 3, pp. 359-371, and "The Methods of Fire-Making," in *Smithsonian Report* for 1890, pp. 395-409; H. Balfour, "The Fire Piston," in *Smithsonian Report* for 1907, pp. 565-593.

On basketry, O. T. Mason, "Aboriginal American Basketry," in *U. S. National Museum Report* for 1902 is the classic monograph. Also to be recommended is the same author's chapter on "The Weaver," in *Woman's Share in Primitive Culture*. An excellent study is Luther Hooper's "The Loom and

Spindle," in *Smithsonian Report* for 1914, pp. 629-678. W. H. Holmes, "Prehistoric Textile Fabrics of the Eastern United States," in *Bureau of American Ethnology, Third Annual Report*, pp. 393-426, is most interesting. This volume also contains W. Matthews' paper, "Navaho Weavers." For prehistoric weaving at its best, consult M. D. C. Crawford, "Peruvian Textiles" and "Peruvian Fabrics," in *Anthropological Papers of the American Museum of Natural History*, vol. 12, parts 3 and 4. G. T. Emmons, "The Chilkat Blanket," in the *Memoirs* of the same institution, vol. 3, pp. 329-400, is a study of a quite special art.

O. T. Mason's chapter on pottery, chapter 5 of *The Origins of Invention*, is interesting and clear. A curious link between textiles and pottery is revealed in W. H. Holmes, "Use of Textiles in Pottery Making," *American Anthropologist*, new series, vol. 3, pp. 397-403. The same author's "Aboriginal Pottery of the Eastern United States," in *Bureau of American Ethnology, Twentieth Annual Report*, pp. 1-201, covers a wide field with a large sweep. For the southwestern United States there may be mentioned Nordenskiöld's work on the Cliff Dwellers, already cited under architecture; F. H. Cushing's suggestive "Study of Pueblo Pottery as Illustrative of Zuñi Culture Growth," in *Bureau of American Ethnology, Fourth Annual Report*, pp. 467-521; and A. V. Kidder, "Pottery of the Pajarito Plateau," in *Memoirs of the American Anthropological Association*, vol. 2, part 6, which illustrates how ancient pottery can be used to unravel the history of peoples leaving no writings behind them. B. Laufer, "The Beginnings of Porcelain in China," *Field Museum of Natural History, Publication 192*, also has an historical background.

Important papers on the bow and arrow are Mason (and others), "Arrows and Arrow-Makers," in *American Anthropologist*, old series, vol. 4, pp. 45-74, and F. H. Cushing, "The Arrow," in the same series, vol. 8, pp. 307-349. A standard work is E. S. Morse, "Ancient and Modern Methods of Arrow-Release," in *Bulletin of the Essex Institute*, vol. 17, pp. 145-198. Thomas Wilson's paper on "Arrow Wounds," *American Anthropologist*, new series, vol. 2, pp. 513-531, demonstrates the power and utility of the bow. On the composite bow see H. Balfour in *Journal of the Royal Anthropological Institute*, vol. 19, pp. 220-250. S. T. Pope, "Yahi Archery," in *University of California Publications in American Archaeology and Ethnology*, vol. 13, pp. 103-152, discusses the use of the bow among civilized and uncivilized peoples. For information on the weapons that preceded the bow, refer to F. Krause, "Sling Contrivances for Projectile Weapons," *Smithsonian Report* for 1904, pp. 619-638, and Gilbert Walker, "Boomerangs," same series, 1901, pp. 515-521. Three useful reviews are W. Hough, "Primitive American Armor," in *U. S. National Museum Report* for 1893, pp. 625-651; O. T. Mason, "Aboriginal American Harpoons," in the same series for 1900, pp. 189-304; and the same author on "North American Bows, Arrows, and Quivers," in *Smithsonian Report* for 1893, pp. 631-679.

Out of the voluminous literature on tools of the several stone and metal ages the following are fairly representative: E. B. Tylor, *The Early History of Mankind*, pp. 194-222; H. F. Osborn, *Men of the Old Stone Age*; R. Munro, *Prehistoric Britain*; J. D. McGuire, "A Study of Primitive Methods of Drilling," in *U. S. National Museum Report* for 1894, pp. 623-756; Spencer and Gillen, *The Northern Tribes of Central Australia*, pp. 634-661; O. Montelius, *The Civilization of Sweden in Heathen Times*; A. Del Mar, *A History of the Precious Metals*; W. S. and K. Routledge, *With a Prehistoric People, the Akikuyu of British East Africa*, pp. 79-95.

On transport and conveyance O. T. Mason has two papers, "The Human Beast of Burden," and "Primitive Travel and Transportation," in the *U. S. National Museum Reports* for 1887, pp. 237-295, and 1894, pp. 237-593.

DRESS

For the origin and psychology of dress, pp. 93-106 of F. Ratzel, *History of Mankind*, vol. 1, is good (this passage is reprinted in Thomas's *Source Book*, pp. 549-558). Other excellent books on this topic are W. I. Thomas, *Sex and Society*, pp. 201-223; W. G. Sumner, *Folkways* (especially the chapter on the Social Codes); and E. Grosse, *Beginnings of Art*, chap. 5.

For the dress and costume of the uncivilized peoples of today, an enormous number of references might be given. It is difficult in all this material to find any unifying principles aside from those noted by Ratzel, Thomas, and Grosse in the passages just mentioned. Some most extraordinary achievements in costume may be seen among primitive people, but dress in works of ethnography is usually discussed quite incidentally to other things. As instructive for the vagaries of the human mind, the pictures in Ratzel's *History of Mankind* are good. Better reproductions will be found in *The Living Races of Mankind*, edited by Hutchinson, and in the volumes (1 and 2) of *The New Natural History* which deal with mankind. For the New World, C. Wissler has a summary in *The American Indian*, pp. 61-67.

On the history of European costume, nothing entirely satisfactory exists. There are more or less elaborate works covering the costume of certain periods or countries, but such works are usually highly technical. Of these, G. Clinch, *English Costume*, is among the best. W. M. Webb, *The Heritage of Dress*, is especially good on peculiarities and survivals of European costume. He attempts to outline the evolution of dress, but his work is patchy and his method somewhat arbitrary. It is certainly the best and most convenient work on costume in general, and includes references to military, clerical, and academic dress of the present time.

THE POSITION OF WOMAN AND MARRIAGE

The classical work on marriage is E. Westermarck's *History of Human Marriage*. Other works are G. E. Howard, *History of Matrimonial Institutions*; Robertson Smith, *Kinship and Marriage in Early Arabia*; Lord Avebury (J. Lubbock), *Origin of Civilization*, chaps. 3 and 4; J. M. Gillette, *Family and Society*; A. Fairbanks, *Introduction to Sociology*, chap. 9; C. Letourneau, *The Evolution of Marriage and the Family*; E. C. Parsons, *The Family*. An excellent survey is furnished by W. H. R. Rivers, article "Marriage," in Hastings' *Encyclopaedia of Religion and Ethics*. The same author's *The Todas*, pp. 502-540, is an interesting account of a more special kind.

On the status of woman, W. I. Thomas, *Sex and Society*, is excellent. Other works are J. F. M'Lennan, *Studies in Ancient History*, part I, chap. 8, or *Primitive Marriage*, chap. 8; E. B. Tylor, "The Matriarchal Family System," in *Nineteenth Century*, vol. 40, pp. 81-96; Beauchamp, "Iroquois Women," in *Journal of American Folk-Lore*, vol. 13, pp. 81-91. O. T. Mason, *Woman's Share in Primitive Culture*, presents data of rather different sort from the preceding.

SOCIAL ORGANIZATION: KIN, CLAN, TOTEM

J. G. Frazer, *Totemism and Exogamy*, is the most inclusive work on these subjects. It expresses the "orthodox" or older point of view, from which many investigators dissent. Andrew Lang, article, "Totemism" in the *Encyclopaedia Britannica*, is one of the dissenters. W. I. Thomas, *Sex and Society*, contains an excellent chapter on exogamy. Other well-known works are: L. H. Morgan, *Ancient Society*; Lord Avebury (Lubbock), *Origin of Civilization*; and J. F. M'Lennan, *Studies in Ancient History*. More modern in attitude than most of the preceding are W. H. R. Rivers, articles, "Kin, Kinship," and "Mother-right," in Hastings' *Encyclopaedia of Religion and Ethics*; R. H. Lowie, "Social Organization," in *American Journal of Sociology*, vol. 20, pp. 68-97; A. A. Goldenweiser, "Social Organization," in *Anthropology in America*, and "Totemism, an Analytical Study," in *Journal of American Folk-Lore*, vol. 23, pp. 179-293; F. Boas, "The Origin of Totemism," in *American Anthropologist*, new series, vol. 18, pp. 319-326.

Special studies of importance include Spencer and Gillen, *Northern Tribes of Central Australia*, chap. 3; R. H. Codrington, *The Melanesians*, pp. 20-45; J. R. Swanton, "Contributions to the Ethnology of the Haida," *Memoirs of the American Museum of Natural History*, vol. 8; B. Freire-Marreco, "Tewa Kinship-Terms from the Pueblo of Hano," in *American Anthropologist*, new series, vol. 16, pp. 269-287; H. Junod, *Life of a South African Tribe*, vol. 2, pp. 329-387; A. B. Ellis, *The Ewe-Speaking Peoples*, pp. 161-182; W. H. R. Rivers, *The Todas*, pp. 540-570. Each of these describes a distinct type or organization of society. As on most topics, C. Wissler, *The American Indian*, pp. 149-163, gives a compact review.

On classes or rank in primitive society, consult E. Sapir, "Social Organization of the West Coast Tribes," in *Transactions of the Royal Society of Canada*, series III, vol. 9, pp. 360-365; E. Tregear, *The Maori Race*, pp. 146-159; J. B. Stair, *Old Samoa*, pp. 65-82; J. Roscoe, *The Baganda*, pp. 246-270.

Secret associations, which always possess a religious as well as social aspect, are discussed in Hutton Webster, *Primitive Secret Societies*, the best general work on the subject in English; and, as they exist among a particular people, the Kwakiutl of Vancouver Island, by F. Boas in *U. S. National Museum Report* for 1895, pp. 315-788.

GOVERNMENT

Political institutions are so interwoven with law and social organization in their origins that they are best examined in connection with these topics. Some additional references for Africa and Oceania, where the idea of rule was especially developed, are: H. Junod, *Life of a South African Tribe*, vol. 1, pp. 329-423; John Roscoe, *The Baganda*, chaps. 7 and 8; A. B. Ellis, *The Ewe-speaking Peoples*, chap. 11; J. B. Stair, *Old Samoa*, chap. 4. There seems to be no general discussion of much reliability on the governments of primitive peoples.

LAW

Sir Henry Maine, *Ancient Law*, is a standard work. The last chapter is especially convenient. R. H. Codrington, *The Melanesians*, contains two chapters (3 and 4), on laws of property among a primitive people governed by chiefs possessing considerable authority. R. F. Harper, *Hammurabi*, and C. H. W. Johns, *The Oldest Law in the World*, give the famous Babylonian code of Hammurabi. In the *Bible*, three successive systems of Hebrew law separated by several centuries are contained in Exodus 20-23, Deuteronomy 12-25, Leviticus 11-20. R. F. Barton, "Ifugao Law," in *University of California Publications in American Archaeology and Ethnology*, vol. 15, pp. 1-186, illustrates very picturesquely how an elaborate system of law can exist among a Philippine people so primitive as to be entirely without government. A curious mingling of primitive and Mohamendan legislation in the same islands is illustrated in W. M. Saleeby, "Studies in Moro History, Law and Religion," *Ethnological Survey of the Philippine Islands, Publications*, vol. 4, pp. 1-107.

ECONOMIC LIFE

On property, labor, trade, and money, there are C. Bücher, *Industrial Evolution*; P. J. H. Grierson, *The Silent Trade*; and among more special accounts, A. W. Howitt, *The Native Tribes of Southeast Australia*, chap. 11; George Brown, *Melanesians and Polynesians*, pp. 294-308; E. Tregear, *The Maori Race*, pp. 123-136; B. Danks, "Shell Money of New Britain," in

Journal of the Anthropological Institute, vol. 17, pp. 305-317; Skeat and Blagden, *Pagan Races of the Malay Peninsula*, vol. 1, pp. 225-241; R. F. Barton, "Ifugao Law" (previously cited), pp. 39-60; A. E. Jenks, "The Bontoc Igorot" (also cited), pp. 85-166; R. E. C. Stearns, "Ethno-Conchology," in *U. S. National Museum Report for 1887*, pp. 297-334; John Roscoe, *The Baganda*, chap. 15.

WAR

On warfare, the following are of interest: G. Friederici, "Scalping Among the North American Indians," in *Smithsonian Report for 1906*, pp. 423-438; an article on the same subject by G. B. Grinnell in *American Anthropologist*, new series, vol. 12, pp. 296-310; the same author's *Blackfoot Lodge Tales*, pp. 82-90, 242-255; J. O. Dorsey, "Omaha Sociology" (previously cited), chap. 9; A. B. Ellis, *The Ewe-speaking Peoples*, chap. 12; E. Tregear, *The Maori Race*, pp. 325-370; G. Turner, *Samoa a Hundred Years Ago*, pp. 189-197. Weapons are described in A. L. Pitt-Rivers, "Primitive Warfare," reprinted in W. I. Thomas' *Source Book for Social Origins*, pp. 373-399.

Of great importance are three inter-related papers by A. F. Bandelier on the war, social organization, government, and land tenure of the ancient Mexicans, in *Peabody Museum Reports*, vol. 2, pp. 95-161, 385-448, 557-699.

LANGUAGE AND WRITING

On the difficult question of the evolution of language, one of the sanest discussions is E. B. Tylor, *Primitive Culture*, chaps. 5, 6, 7. Greenough and Kittridge, *Words and their Ways in English Speech*, chap. 1, is excellent. Many of the relations of the languages of primitive and civilized nations are reviewed by F. Boas in the Introduction of the "Handbook of American Indian Languages," *Bureau of American Ethnology, Bulletin 40*; and by E. Sapir, "The History and Varieties of Human Speech," in *Popular Science Monthly*, vol. 79, pp. 45-67. Other works, by Whitney, Lefèvre, and Tylor, have already been cited under the heading "Development of Mind."

There is a quite extensive literature concerning the early graphic systems in the Mediterranean area, but this literature mostly swings between technicalities and theory. The best book is Isaac Taylor, *The Alphabet*. Less exact, but very easy to read, is E. Clodd, *The Story of the Alphabet*. An excellent passage dealing with the subject in a general way will be found in E. B. Tylor, *Early History of Mankind*, chaps. 5 and 6. W. J. Hoffman, *The Beginnings of Writing*, is also a good general work.

As illustrative of the American Indian attempts at record-making, D. G. Mallery, "Picture-Writing of the American Indians," *Bureau of American Ethnology, Tenth Annual Report*, might be cited. The more advanced systems of middle America are described with all possible clearness in H. J. Spinden, *Ancient Civilizations of Mexico and Central America*, and S. G. Morley, "Intro-

duction to the Study of the Maya Hieroglyphs," *Bureau of American Ethnology, Bulletin 58*.

On communication by gestures there are W. P. Clark, *The Indian Sign Language*, and D. G. Mallery on the same subject in the *First Annual Report of the Bureau of American Ethnology*.

SCIENCE AND KNOWLEDGE

On the first beginnings of science, E. B. Tylor has an admirable review in his *Anthropology*, chap. 13. The origins of mathematics are discussed by L. L. Conant, *The Number Concept*; somewhat heavily by W. J. McGee, "Primitive Numbers," in *Bureau of American Ethnology, Nineteenth Annual Report*, pp. 821-851; and, with reference to both numeration and calendar among an ancient advanced people, the above mentioned work by Morley on Maya hieroglyphs. Primitive calendar systems and chronology in general are a rather difficult subject, which appears not to have been adequately treated in a broad way.

ART

Art from the ethnographical standpoint is well represented in literature. Important from the side both of method and subject-matter is F. Boas, "The Decorative Art of the Indians of the North Pacific Coast," *American Museum of Natural History, Bulletin*, vol. 9, pp. 123-176. A. C. Haddon, "The Decorative Art of British New Guinea," *Royal Irish Academy, Cunningham Memoirs*, no. 10, is a classical work, and is the basis of his later book quoted below. H. Tongue, *Bushman Paintings*, gives a rather unsystematic account of certain famous paintings left by the Bushmen in the caves and rock-shelters of South Africa. With relation to the Eskimo, who have an interesting art, a large but somewhat unorganized monograph is W. J. Hoffman, "The Graphic Art of the Eskimo," in *Report of the U. S. National Museum* for 1895, part 2. A noteworthy summary of all the results so far attained by studies in America is Boas, "The Decorative Art of the North American Indians," in *Popular Science Monthly*, vol. 63, pp. 481-498. On Central America, where the artistic remains are most unusual, a remarkable work is H. J. Spinden, "Maya Art," in *Peabody Museum, Harvard University, Memoirs*, vol. 6.

Several papers that can be highly recommended are the following: W. H. Holmes, "On the Evolution of Ornament," in *American Anthropologist*, old series, vol. 3, pp. 137-146; the same, "Studies in Aboriginal Decorative Art," in *American Anthropologist*, old series, vol. 5, pp. 67-72; A. D. F. Hamlin, "The Evolution of Decorative Motives," in *American Architect*, vol. 59, pp. 35-36, 51, 91-94; vol. 60, pp. 43-45, 67-68. The following works are of a general nature: A. C. Haddon, *The Evolution of Art*; H. Balfour, *The Evolution of Decorative Art*; E. Grosse, *The Beginnings of Art* (includes music and the drama, and relies mainly upon ethnographical methods); W. H. Goodyear, *The Grammar of the Lotus*; Y. Hirn, *Origins of Art*.

Music is a topic which it seems possible to treat only vaguely or technically. The best book, though not a wholly satisfactory one, is R. Wallaschek, *Primitive Music*. C. H. Parry, *The Evolution of the Art of Music*, chaps. 1-3, is excellent so far as it goes.

Primitive literature is best considered in connection with mythology, which see.

RELIGION AND MAGIC

Of the numerous general discussions on religion, those of E. B. Tylor in his *Primitive Culture*, vol. 1, pp. 417 ff., and *Early History of Mankind*, chap. 6, are still valuable and stimulating. J. G. Frazer's monumental *Golden Bough* (third edition) is invaluable as a storehouse of important facts but is often quite unacceptable on points of interpretation. An interesting theoretical discussion of religion is to be found in Andrew Lang's *The Making of Religion and Magic and Religion*.

Every good monograph on primitive peoples contains descriptions of their religion. For the important concept of supernatural power the best references are R. H. Codrington, *The Melanesians*, pp. 191-218; W. Jones, "The Algonkin Manitou," in *Journal of American Folk-Lore*, vol. 18, pp. 183-190, and J. N. B. Hewitt, "Orenda," in *American Anthropologist*, new series, vol. 4, pp. 33-46.

The vague belief in monotheism encountered among certain tribes is discussed in H. Callaway, *The Religious System of the Amazulu*; A. W. Howitt, *Native Tribes of South-East Australia*, pp. 448 ff., and G. B. Grinnell, "Pawnee Mythology," in *Journal of American Folk-Lore*, vol. 6, pp. 113 ff.

Fetichism is excellently treated in R. H. Nassau, *Fetichism in West Africa*, and M. Kingsley, *Travels in West Africa*, pp. 296-385. The belief in guardian spirits so characteristic of the North American Indians is discussed by F. Boas, article, "Religion," in *Bureau of American Ethnology, Bulletin 30*; and J. O. Dorsey, "A Study of Siouan Cults," in *Bureau of American Ethnology, Eleventh Annual Report*. For Africa the best treatment of this subject is A. B. Ellis, *The Yoruba-speaking Peoples of the Slave Coast of West Africa*, pp. 34-93, and the same author's *Ewe-speaking Peoples of the Slave Coast*, pp. 31-101.

The shamanism of the Siberian tribes is well summarized in M. H. Czaplicka, *Aboriginal Siberia*, pp. 166-291.

No good general discussion of ceremonialism exists. Descriptions of typical ceremonies are to be found in Spencer and Gillen, *The Native Tribes of Central Australia*, pp. 128-387; R. H. Codrington, *The Melanesians*, pp. 69-117; H. Junod, *The Life of a South African Tribe*, vol. 1, pp. 35-216; W. H. R. Rivers, *The Todas*, pp. 38-461; A. B. Ellis, *The Ewe-speaking Peoples*, pp. 117-161; L. Benedict, "A Story of Bagoto Ceremonial, Magic and Religion," in *Annals of the New York Academy of Sciences*, vol. 25; W. J. Hoffman, "The Midewiwin of the Ojibwa," in *Bureau of American Ethnology, Seventh Annual Report*; J. G. Bourke, *The Snake Dance of the Moquis of Arizona*.

An excellent general treatment of magic is given in J. G. Frazer, *The Golden Bough—The Magic Art*. Good special accounts are to be found in W. Skeat, *Malay Magic*, and H. Junod, *The Life of a South African Tribe*, vol. 2, pp. 412-488.

MYTHOLOGY

An elaborate treatment of the mythologies of all peoples is in process of publication under the title *The Mythology of all Races*. Excellent theoretical and historical discussions are Andrew Lang's introduction to the English translation of *Grimm's Household Tales* (Bohn Library), and F. Boas, "Mythology and Folk-tales of the North American Indians," in *Anthropology in North America*, pp. 306-349.

Of the numerous collections of folk lore the following are interesting and representative: W. H. Bleek and H. Lloyd, *Specimens of Bushman Folk-lore*; G. Grey, *Polynesian Mythology*; R. H. Nassau, *Where Animals Talk*; H. T. Rink, *Tales and Traditions of the Eskimo*; W. Matthews, "Navaho Legends," in *Memoirs of the American Folk-Lore Society*, vol. 5; G. B. Grinnell, *Blackfoot Lodge Tales*.

ETHICS

An enormous mass of material on ethics provided with a stimulating discussion is contained in E. A. Westermarck, *The Origin and Development of Moral Ideas*, 2 vols. A shorter discussion of the same subject is given by L. T. Hobhouse in *Morals in Evolution*. Excellent observations are likewise to be found in R. H. Marett, *Anthropology*, chaps. 9 and 10, and F. Boas, *The Mind of Primitive Man*, chap. 8. One of the most penetrating discussions of morals and customs is W. G. Sumner, *Folkways*.



